

■ NEW PROBLEMS OF PHILOSOPHY

ROUTLEDGE

THINKING AND PERCEIVING

DUSTIN STOKES



THINKING AND PERCEIVING

On the Malleability of the Mind

Human beings are in contact with the world through their minds. One can make sensory perceptual contact with the world: One sees the tree and hears its leaves flutter. And one makes cognitive contact with the world: One forms beliefs about the tree, memories of how it was in the past, and expectations of how it will be in the future. Can the first, perception, be influenced in important ways by the second, cognition? Do cognitive states such as memories, beliefs, and expectations affect what one perceives through the senses? And what is the importance of these possible relations to how we theorize and understand the human mind?

Possible cognitive influence on perception (sometimes called “cognitive penetration of perception”) has been long debated in philosophy of mind and cognitive science: Some argue that such influence occurs, while others argue that it does not or cannot. In this excellent introduction and overview of the problem, Dustin Stokes examines the following:

- The philosophical and scientific background to cognition and perception
- Contemporary ways of distinguishing cognition and perception
- Questions about the representational content of perception versus cognition
- Distinct theories of mental architecture: modularity versus malleability
- Consequences for epistemology, philosophy of science, and aesthetics
- Philosophical and scientific research on perceptual attention
- Perceptual skill, learning, and expertise
- Perceptual content, objectivity, and cultural bias.

Additional features, such as chapter summaries, suggestions for further reading, and a glossary, make *Thinking and Perceiving* an ideal resource for students of philosophy of mind and psychology, cognitive psychology, and cognitive science.

Dustin Stokes is Associate Professor of Philosophy at the University of Utah, Salt Lake City, USA. He works primarily on the philosophy and science of perception, imagination and imagery, and creativity. With Stephen Biggs and Mohan Matthen, he is editor of *Perception and Its Modalities* (2014).

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On the Malleability of the Mind

Dustin Stokes

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To my mother, who was the first to instill in me a love for the spoken word, and who has never failed to support me, with love and earnest encouragement, through my life's pursuits.



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INTRODUCTION

To be in the world is to be in contact with it. This is not a distinctively human phenomenon, or even one exclusive to living organisms. Tables and chairs, sticks and stones, soundwaves and bits of matter are all objects that are in contact with other worldly objects. An intuitive notion of contact can help us to understand similarly intuitive features – which isn't to say unimportant or unreal features – of the animate and inanimate world and, importantly, about the human mind.

Try to imagine an object in the world that is not in contact with anything else. You may find this hard to do. You can, of course, imagine an object, perhaps any object, all alone in some science fictional void. Philosophers allege to be very good at this kind of thought experiment. But this is not to imagine a lone object *in the world*. So then one might think of abstract objects. For example, some believe that there exist objects beyond those in the physical world, such as numbers. But you don't step on a number on your way to the café or bump into one as you get a drink of water in the middle of the night. Numbers are not, in an important sense, in the world. One way to make sense of this non-worldly existence of a number is to say that it is not in contact with worldly objects, whether it is you or me, or a stick or a stone. Worldly objects, then, seem to be objects that can be in contact with others. This may just be what it means to say that something is *in the world*. This raises a new question: What are the different ways that objects can be in contact with one another?

From an intuitive folk perspective, objects are in contact when they are “in touch” with one another. My coffee cup sits on my desk. My feet are touching the floor. And so on. And, intuitively, objects that are in contact can often move one another. The coffee cup can be moved across the desk by a third object, say my hand. It is now in contact both with the desk and with my hand. Not all objects can move themselves, but most can be moved by some other object(s). Physics largely vindicates these and other intuitions about contact, identifying types of spatial relations between objects and how various forces can effectively exploit those spatial relations for causal ones. The coffee cup moved by the hand is described by the physicist as a *contact force* where, strictly speaking, the objects do not touch but electrons near their surfaces do. When this happens, the rest/motion state of one object is changed by another. Although it may use terms other than “contact”, modern physics further identifies a number of ways that physical entities interact – electrical interactions, magnetic forces, gravitational pulls – which further clarify how those entities are in contact with one another. The physical world of objects is a world of entities in contact. Physics illuminates what folk intuition starts with (that, and more, of course).

That said, the notion of “contact” used here is not, or at least is not restricted to, a technical one like one(s) identified by the physicist, but is instead an intuitive notion useful for identifying differences and similarities between the ways that we situate ourselves, as creatures with very sophisticated minds, within the world. It includes causal relations but is not exclusive to them. The pebble on the ground is in contact with the ground, but perhaps neither is causally affecting the other. Maybe we want to describe this as a potential causal relation: For instance, if the ground shakes, the pebble will be moved. Contact can also occur at great distance. The ultraviolet light from the sun doesn’t move the (macroscopic) object, but waves of light do get absorbed by most objects and, consequently, they heat. We naturally say of such a situation that the sun is “hitting” or “touching” it. This, too, is an intuitive form of contact between entities.

Now consider objects with minds: a bird, a dog, a dolphin, or us. As physical objects, such creatures can obviously be in straightforward physical contact with others. They can also be moved causally by other objects and can themselves animate other objects. But they can importantly do more than this and, like the sun, from considerable distance. The bird that hears a song from its mate across the field is in touch with its mate. The dog that sees the frisbee as it flies through the air is in contact with the frisbee. The dolphin maintains contact with its peers by transmitting and receiving meaningful

noises underwater. These are familiar ways that an animal can be in contact, through its senses, with the world.

Contact with the world is not distinctive of humans. But what may be distinctively human is the richness and variety of the contact we can make with the world, with our bodies and minds. Most obviously, humans use their bodies to carry out actions: to walk across the grove, reach for and grasp an apple, take a bite of the apple. Perhaps less actively, one is also in contact with the world through one's sensory perceptual capacities, just like other animals. With some sensory modalities, this contact may seem less direct than bodily action. But here, too, there is *exchange of energy*. With audition, for example, sound waves in the immediate environment cause vibrations in the eardrum; this pressure is amplified to affect fluids in the inner ear – the cochlea; activity in these fluids causes vibrations in tiny fibres in the cochlea; and finally, certain frequencies of those vibrations activate tiny hair cells which, through the cochlear nerve, send electrical energy to the cerebral cortex. So although through a long causal chain, there is a clear sense in which the auditory experience that one enjoys is a way of being in contact with the world outside of oneself. This *sensory transduction* likewise occurs for experiences in other sensory modalities. Perhaps the least directly, humans can be in contact with the world by using various modes of cognition: We form beliefs about the objects in our environment, memories of how it was in the past, and expectations of how it will be in the future. The reader might pause here to consider the importance of how we make contact with our world and with one another. Imagine how dramatically different, perhaps inhuman, our existence would be if we did not enjoy the richness of contact that our minds afford. One way to understand this book is as an attempt to make sense of perceptual contact and cognitive contact and their relations. And this is no mere academic or scientific exercise.

What perceptual contact gives one, when one's sensory systems are working properly, is information about one's environment. The visual experience of the apple on the tree carries information, for the perceiver, about important features of one's world. So, in addition to, and plausibly because of, the exchange of energy between world and perceiver, there is an *exchange of information* between world and perceiver. This is what cognitive contact provides as well, even if it is contact that does not (always) involve exchange of energy. When I am recalling my experience of the apple grove yesterday, I maintain contact with that part of the world by carrying information about it. This is true of any kind of accurate thought that one has about the world: Those thoughts stand in informational relations with the objects, features,

and events that they are about. Put in another idiom, perceptual and cognitive contact are (re)presentational connections with the world.

This suggests a way of marking a distinction that some find intuitive and that philosophy and psychology have tended to mark in theory: the distinction between perception and cognition, between, say, seeing an apple versus thinking about an apple. The first seems to require exchange of energy, while the second does not. Except in rare cases of hallucination, any particular perceptual experience is one that requires some exchange of energy between world and perceiver. Some feature of the world has to cause some kind of response in one's sensory organs. This is not true for any particular cognitive state that one might have. One can have beliefs, memories, expectations, and so on about things with which one is not presently in that kind of contact (that is, where no relevant exchange of energy is occurring). But note, at the same time, how both involve maintaining contact through information: My visual experience and my memory of the apple both carry information about that worldly object. Which matters more: the difference with respect to energy or the similarity with respect to information? And how will either contribute to vindicating (or undermining) the distinction between thinking and perceiving?

If we consider contact in the basic sense of two objects causally relating and in the sense of sensory contact, we see that there is not a clean or easy distinction to be made between the first and the second, at least not with respect to the exchange of energy. But in philosophy and cognitive science, it is assumed by many that there is some clean distinction between the kind of informational contact with the world that, say, vision affords and the kind of informational contact that, say, belief affords. Again, cognition is supposed to be distinct from sensory perception, and moreover the two are supposed to function in importantly independent ways. This is often described with computational language. The computations performed by vision, once it has received information (via energy) from the external worldly stimulus, run independently of any computations being run by cognitive systems. The central question to be discussed over the chapters that follow is whether and how this is true. Are cognition and perception so isolated? Or given that they are both rich and important means by which humans achieve and maintain informational contact with the world, are they connected and intertwined in ways that depart from the theoretical orthodoxy? Put most simply, how much, and in what ways, does thought influence perception?

In Chapter 1, thought and perception will be distinguished with more precision, with a number of possible criteria for distinction discussed. For now,

just grant the intuitive distinction between cognitive states like belief or judgment, on the one hand, versus sensory perceptual experiences like seeing or hearing, on the other. The question is how the first, cognition, might influence the second, perception. Consider some example cases. Some of these are phenomena about which no party would disagree. That is, they actually happen, and we can be confident about this from both an intuitive and scientific perspective. Others are more controversial. It's the controversial cases that will populate this book, but we do well to identify a range of cases, moving from the least to the most controversial so that, ultimately, we can identify structural similarities and differences between them and, with any luck, better understand how the mind works and how it puts us in contact with the world.

1 The first time you saw the Müller-Lyer illusion you, like most subjects, perceived one line as longer than the other. But then someone informed you that this was an illusion and that, in fact, the lines were of the same length. You believed your informant (perhaps they provided you with demonstrative proof), and as a result you come to believe that the lines are of the same length. But because it is a *persistent visual illusion*, the change in belief does not change your visual perception: You still visually perceive the lines such that one appears longer than the other.

Here cognition is affecting cognition, but without affecting visual experience.

2 You've hired a fancy interior designer. He has brought you an item for your living room: It's a bright pink, faux animal rug. "Faux animal hair is back. And this is 'millennial pink'. It's fab.," he says. You take one look at the thing and you feel queasy. "Get that thing out of my sight!" you implore. Your hired design hand complies, rolling the rug and removing it from view.

Here a cognitive state, say a judgment or evaluation, causes you to issue a command, and as a result the available visual stimuli change and, consequently, you have a distinct visual experience: no more millennial pink experience for you!

3 You're at a modern art gallery. You've found yourself in a room full of Pollocks. You don't like Pollock. You know the drill: You are told that it's an "action painting" and that the marks on the canvas are a record of Pollock's movement. But it still looks like a chaotic mess to you. You decide to skip this room and walk to the next. Ahhh . . . Rothko. Peaceful. Orderly. Simple. You have a seat and take in the calm room.

Here cognitive states (or a decision partly constituted by such states) causes an action, and as a result of that action you have distinct perceptual experiences.

4 I'm writing this chapter using word processing software on my desktop computer. I try to stay focused on the current task, but it's also World Cup season. I have the current match streaming on a small window in the upper-left portion of my screen. I abandon writing for a few minutes and shift my focus to the match.

Here what I believe (and desire) about available visual information causes me to shift my attention from one portion of my visual field to another and, consequently, to have a different visual experience.

5 You go to pick your friend up at the airport on an extremely busy travel day. You meet her in the baggage claim terminal. There is a sea of baggage, most of it darkly coloured, black or navy, and so you begin aimlessly, visually scanning. "My bag is orange", your friend says to you. Upon receipt of this information, the few brightly coloured pieces of luggage pop out, becoming salient in your experience.

Here, what you believe – that the item of interest is orange – causes attention to select items with that feature. This aids visual search and, on one interpretation*, plausibly generates a different visual experience than the one you had prior to learning the colour of your friend's luggage and as a result of your forming a belief about the orange luggage.

6 You hold an item in each hand. In the right hand is an American quarter; in the left hand is a metal disc of the exact same size and shape. You hold both before me in plain sight and ask which is bigger. I report that the quarter appears bigger. We repeat this procedure multiple times, with coins of different values, and I consistently report that the coin is larger than what (in actual fact) is an identically sized metal disc.

Here what I believe – that one object is a bit of valuable currency and another is not – is influencing the reports that I make about the size of objects. On one interpretation*, this belief (or beliefs) is affecting the visual appearance of things, and that is why I report as I do. It is affecting low level-vision, namely, the representation of the size of objects, such that I see the coin as larger than the analogous metal disc.

7 Consider the expert ornithologist. Before taking up birdwatching, to this individual, birds looked like, well, birds: objects with roughly the same shape, texture, and size (at least relative to other objects). But after the ornithologist has achieved a high level of expertise, she is able to categorize birds with a high level of specificity – this one is an eastern kingbird, that one an eastern phoebe – and to distinguish individuals one from another. She can do this rapidly and on the basis of her visual experience of birds.

Here, what the expert has learned about categories of bird clearly influences what and how she is able to make judgments about birds. On one interpretation*, this learning is or has also influenced how she sees birds. For the expert, but not for the novice, visual perception picks up – represents – high-level categorical information about birds. The expert doesn't just judge that a particular bird is an eastern kingbird, she visually perceives this.

Cases 1–4 are not controversial. Each of these phenomena are actual, and they possess the mental features attributed to them, as described. And there are countless other cases that take the structure of such cases. Cases like 5–7 do occur under some description. But there is substantial controversy regarding how such cases should be explained in terms of their mental features. A relevant controversial interpretation has been offered for each of these cases, marked with an *.

The theoretical aim of this book is to defend cases like 5–7 as occurring and as being best explained in something like the ways given by the controversial interpretations (those marked with an *). Contrary to orthodoxy in philosophy and cognitive science, the claim is that thinking influences perceiving not just by causing intermediate action or overt attentional shifts but in more nuanced and direct ways. These influences on perception are deeply important for philosophical and scientific theorizing both, as we will see. They are also important for how we conceive of ourselves as being in the world. To make this case, though, a broad survey of some of the existing, relevant conceptual and experimental work in perception studies is needed.

Chapter preview

The goal of Chapter 1 is to provide the reader with some intuitive, and then more sophisticated, understanding of how philosophers distinguish thought or cognition, on the one hand, from perception or sensory experience, on the other; identify important similarities and differences between the two broad categories of mental process; and, finally, identify possible interactions between these processes and their importance.

Chapter 2 critically analyzes the modularity theory of perceptual systems. This theory denies that one's thoughts can influence one's visual experiences in any interesting or direct way. Vision, like other perceptual systems, is argued to be functionally independent of cognitive states like belief. The chapter identifies the central commitments of that theory and its clearest and most formidable arguments. It criticizes those arguments and concludes that they are insufficient to support the theory and the orthodox place it holds

in contemporary philosophy of perception and cognitive science. Chapter 3 couples with Chapter 2, offering a brief survey of types of empirical cases that have been employed to oppose modularity.

Chapters 4 and 5 attempt to shift the discussion of possible cognitive effects on perception. Chapter 4 focuses on definitions of the “cognitive penetration” of perception, suggesting that the variety of extant definitions, given their differences, may ultimately miss what is most important to all theorists involved in the debate(s). The suggestion, indeed, the methodological prescription, is to look not for phenomena that satisfy this or that definition, but instead for cognitive-perceptual relations that bear some of the consequences of interest to all parties in the relevant debates. Chapter 5 focuses on what kinds of mental process or mechanism are relevant when asking if thinking affects perceiving. The mechanism of central interest is covert, selective attention. The chapter argues that when attention takes this form (by contrast to overt, spatial attention) and plays a role in cognitive effects on perception, we plausibly have instances of important and/or direct cognitive influence on perception.

Chapters 6 through 8 attempt a more dramatic shift to the discussion on cognitive effects on perception. The phenomenon of central emphasis is perceptual expertise. The attempted shift is multi-faceted. First, it encourages an emphasis on possible and, it will be argued, actual cases of perceptual improvement. This contrasts with the standard and dominant emphasis (in this particular literature, and in philosophy of perception more generally) on negative or neutral cases, cases where we, at worst, suffer illusion or hallucination and, at best, just perceive “normally”. This involves both an architectural component and an epistemological one. By appeal to a large set of empirical studies and a wide range of experimental methods, Chapter 6 argues that perceptual experience can change in important ways as a consequence of concept-rich, cognitive learning. Chapter 7 then argues that such cases are not only epistemically good, but they are epistemically virtuous, involving acquisition of cognitively enhanced perceptual skills, and ones for which the expert is to be credited. Chapter 8 then teases out some of the most interesting consequences from those architectural and epistemological analyses, concerning scientific investigation and theory-ladenness, implicit bias and stereotype, and objectivity and perceptual content.

The second attempted shift, important enough to foreshadow here, is a dialectical one. Since relevant concepts have not yet been provided for the reader, the foreshadowing will be light. In the literature on cognitive effects on perception (sometimes called the “cognitive penetration” literature),

a standard assumption is made by theorists on both sides of the debate. That assumption is that there is a default theory of perception, at least with respect to how thought may affect perception. That theory is modularity. Any theorist who wants to claim that cognition importantly influences perception thus tends to defend cases as providing counterexamples to the default theory. Advocates of the default theory then argue that those counterexamples fail. (The reader will find examples of this in early chapters of the book.) For this theoretical situation to be well grounded, for a theory to be the *default*, it must enjoy powerful arguments or powerful explanatory and predictive purchase, ideally both. The critical mode of this book is that the putative default theory enjoys neither. The positive mode of this book – and the chapters on perceptual expertise are central here – is to pivot to cases of cognitive improvement of perception and a mental architecture that characterizes perception as malleable. And the cases are positive both in the sense that they are epistemically virtuous and in the sense that they are explained and argued on their own merits. The second shift, thus, is away from a proof-by-disproof strategy to a proof-by-proof strategy. Put another way, the theoretical approach advocated here, even if incomplete, is an *alternative* approach, and its value is not beholden to providing or being a counterexample to the default.

How and whether thinking affects perceiving is a deeply important question. Of course it is of scientific interest: To understand the human mind is to understand how we best distinguish its processes, how those processes interact, and what this implies for how and what we may know about the world. And so in the philosopher's terms, this book is one on both mental architecture and the epistemology of perception. But there is a more human interest, and one that will increasingly surface over the course of the chapters that follow. How we make contact with the world, and with one another, is of the most basic of importance. We can make both sensory contact and cognitive contact with the world. The first is traditionally supposed to be determined by the biological nature of our sensory systems, while the second is at least partly determined by us, what we have learned, our experiences, and so on. The most basic claim of the book is that this is mistaken and importantly so. Our sensory contact with the world can also change and in a way that is importantly affected by the cognitive contact that we have, or have had, with the world. Thinking does not just affect perceiving; thinking improves perceiving. If this is true, it changes not only how we should theorize the mind; it changes how we should understand, as individuals, our place in and contact with the world.

1

THOUGHT AND PERCEPTION: DISTINCTIONS, SIMILARITIES, AND RELATIONS

- 1.1 “Defining” by ostension**
- 1.2 The importance of cognitive influence on perception: an initial gloss**
- 1.3 Reductive and revisionary theories**
- 1.4 Perception and thought: grounds for distinction**
- 1.5 Mental content and its importance**
- 1.6 Summary**

There are different ways of making contact with the world. Perhaps most obviously, one can perform actions on the objects and features of one’s surroundings: One can kick the football, grab the coffee cup, pat the dog on the head, and so on. One can also relate to, be in touch with, make contact with the world via one’s mind. When one sees or hears or smells parts of the world, this is sensory contact with the world. And one can maintain contact with the world cognitively by making judgments about it, or forming beliefs about it, or imagining a pleasant event of the past. Both sensory contact and cognitive contact involve mental states that are about the world. They both involve being in contact through, or by carrying, information. When one

sees the apple tree or when one believes that there is an apple tree on the other side of the house, one carries information about the world.

This chapter proceeds as follows. First by appeal to ordinary and theoretical practices, Section 1.1 provides a preliminary list of mental phenomena that are typically categorized as perception and those that are typically categorized as cognition. Not all of the complications that come with this task will be decisively addressed here, and so the chapter then moves on to analyze ways that paradigmatic cognitive states and paradigmatic perceptual states might relate as a conceptual or empirical matter. Section 1.2 offers some initial characterization of the importance of possible relations between cognition and perception and of the putative distinction between the phenomena. Section 1.3 considers the philosophical view that perception just is, in some sense, a kind of belief and the psychological view that there is no clear distinction between perception and cognition. Section 1.4 considers five possible, non-exclusive modes for distinguishing thought from perception. The reader should hereby acquire a handful of useful concepts for thinking about the remainder of the big questions of the book, centrally, how thought may importantly affect perception, how cognitive contact may influence sensory contact. Finally, Section 1.5 focuses on an important related set of issues: how both cognitive states and perceptual states are representational states with content and how the natures of such content may be the same or different. Here, too, the philosophical problems and technical concepts employed to discuss them will prove useful for navigating the problems and analyses, and their importance, that follow in the rest of the book.

1.1 “Defining” by ostension

The strategy of this section is to see how much we can learn about perception and thought, and how they are distinguished, by considering our more ordinary concepts, as well as some more sophisticated practices of theorizing about them.

Begin by considering how we ordinarily think and talk about the relevant mental concepts, beginning with perception. A common way to think about perception is as a person’s understanding of or stance on things. We say things like “That speech changed my whole perception of things”; “The East’s perception of the West has shifted”; “They perceived their imminent doom.” Likewise for terms specific to particular sensory modalities, we say things like, “I see what you mean” or “I hear what you’re saying.” We might call this notion *perception-as-outlook*. But if we derived our notion of perception

from these linguistic practices, it either won't deliver an unequivocal verdict (which should not be expected from an ordinary language analysis) or will not deliver a meaning that accords with more theoretical uses of the term(s). But there is another set of uses that points to the standard understanding of perception in philosophy and psychology.

We also use perceptual terms in ways reserved for sensory experiences and at the exclusion of non-sensory mental states. For example, suppose you are disputing with a friend whether another friend was at the party. You might say something like "I think she was there." And your friend, still unconvinced, might reply "Ok, but did you *see* her there." Here, the use of the perceptual term "see" is used to exclusively denote visual experience. The only kind of evidence that will do is visual evidence. What you judge, or believe, or think simply isn't relevant to this use of the perceptual term. Similarly for other sensory modality terms. Attempting to persuade your partner that you are getting a raise, he might reply "Did you actually *hear* your boss say 'raise'?" And if that auditory experience wasn't had, then you simply lack the requested perceptual evidence.

The linguistic practice, then, is one where if we want to denote perception in a sense more restricted than perception-as-outlook, we often employ terms specific to distinctive sensory modalities, to olfaction, audition, vision, and so on. Practice in psychological science follows this pattern in important ways. In descriptions of research projects, research labs, and relevant research literature, psychologists often describe the target phenomenon in terms more specific than "perception": they speak of "vision", or "audition", or "touch". This is partly for a simple reason: Those phenomena are their research specializations! But whether intentional or not, the practice also serves to disambiguate the language in a way that mirrors ordinary practices. Psychologists, and to a lesser degree ordinary language practices, similarly use general sensory terms when they mean the more restricted sense of perception, they refer to "sensory perception" or "sense perception".

Following these practices, perception is sensory perception. Although even here there are complications, perceiving includes, in the paradigmatic instances, experiences had via the Aristotelian senses: seeing, hearing, touching, smelling, and tasting. It plausibly also includes proprioceptive experiences, and perhaps further some type of "inner" awareness of one's bodily activity.¹ To start, we can take "perception" to denote any of the mental types on this list. It is a capacity for sensory representation by, as it is sometimes put, an individual. It "is a referential and attributive ability to represent basic mind-independent features of the environment. It is a capacity for objective

representation” (Copenhaver 2013: 1065). As Tyler Burge has argued, this representational role – which is *objective* in the sense that it involves attributing features to particular objects in the perceiver’s environment – is the function of perceptual systems (2010).² This leaves space for the possibility of unconscious perception and sub-personal perceptual processes. That said, the form of perception of central interest in this book is conscious perception. *Perceptual experience* is conscious sensory representation.³ Such mental states are *conscious*, at least, in the sense that they have a phenomenology; there is *something that it’s like*, for the perceiver, to be in them. The notion of objective sensory representation and sensory phenomenology come together in an important way. As Fred Dretske once put it:

the way things phenomenally seem to be (when, for instance, one sees or hallucinates an orange pumpkin), are – all of them – properties the experience represents things as having. Since the qualities objects are represented as having are qualities they sometimes – in fact (given a modicum of realism) qualities they usually – possess, the features that define what it is like to have an experience are properties the objects we experience (not our experience of them) have.

(Dretske 2003: 67)

Perceptual experience is thus *transparent*, where the sensory appearances of objects and events involve attribution of features to those objects and events (Harman 1990). You perceive the pumpkin, not your perception of it, as orange. Your conscious awareness is of the mind-independent object – the pumpkin – not of your experience. Phenomenality is thus subjective in the sense that there is something that it is like for the perceiver; but it is objective in the sense that “it” (the object perceived, not the experience itself) is perceived to be that way.

Now consider cognition or thought. First, a note on why it will be assumed that both of these terms refer, more or less, to the same broad category of mental phenomena. This assumption bumps up against our ordinary uses of the terms, since they do not obviously align. This is partly for the trivial reason that “thought” is a familiar term to just about anyone, while “cognition” is a more theoretical term, even if it is entering more into the fold of popular usage. What kinds of mental activities do we refer to when using “thought” and its cognates? Sometimes we clearly use it to describe cases where we are mentally jogging through various ideas or possibilities, when we are reasoning, and when we are pondering over a decision. We say things like “Let’s

think about where we should take a summer holiday”; “I thought the correct answer was 1626”; or most simply, “I’m thinking about it” to denote that a decision may be forthcoming but one hasn’t arrived there yet. We also sometimes use the terms in a more restrictive, or at least somewhat different, way, to denote that we have some commitment to the truth of some state of affairs but perhaps without complete certainty. For example, I might say “I think the game is on Sunday morning, not Saturday” or, with less commitment and probably indicating an admission of error, “I really thought the game was on Sunday morning.” Here again ordinary language analysis is inconclusive. But we can note a few things. First, at least these uses all seem distinct from the restrictive use of perceptual terms and what they denote: None of the concepts of thought at work here appear to be sensory in any way. Second, the kinds of activities described here match up fairly well with those that philosophers and cognitive scientists denote with “cognition” and its cognates.

Cognitive science today is broad in its scope of inquiry. But more traditionally (at least going back to the middle and later 20th century, when the discipline was just being formed), the emphasis was certainly on thought, as described earlier. The central point of debate in the discipline then, and in some quarters now, is whether genuine artificial intelligence was achievable. Can a machine think? Can it enjoy intelligence of the kind that humans clearly do and that arguably no other non-human animal does? Accordingly, empirical studies of cognition in the discipline centred around attempts to build artificial systems capable of reason, of language use, of problem-solving, of decision-making. Note that this comports well with how thought was described earlier. The debates about the possibility of genuinely intelligent computers or machines do not concern sensory capacities – engineers and computer scientists have been quite successful in developing systems that respond to the environment through sensory proxies. The debates concern the capacity for thought or cognition. Following this theoretical practice, and the fact that what the cognitive scientist calls “cognition” and what the folk call “thought” seem largely to be the same thing, we will use these terms interchangeably.

So what is thought or cognition? A relatively restrictive way to characterize thought is just as those mental events or processes that relate to or somehow contribute to knowledge. Belief is the paradigmatic example. Although there are distinct theories of belief, just about any theory will understand belief as a state or attitude towards some proposition, *P*, where one possesses a conviction that *P* is true. If I believe that Sweden won the match, I am likely to report this proposition when relevant, form further

beliefs about further stages of the tournament, and so on. Furthermore, most take beliefs to be *dispositional states*, in the sense that a belief will manifest in behaviour (for example, asserting that P is true) only in relevant circumstances. This allows for a subject to have many beliefs, but only a few are operative or *occurrent* at any one time. Beliefs are thus the central example of what philosophers call *doxastic states*. Other fairly standard candidates for doxastic states, insofar as they also involve some commitment to the truth of the proposition mentally represented, are judgments, opinions, expectations, and memories.

A less restrictive way to characterize thought is to tie it to reasoning and action. Thus, doxastic states like those noted earlier would be included, since they contribute to our decision-making and reasoning and, often enough, to how we act. But doxastic states do not exhaust those that contribute to decision-making and action planning. We decide and act on the basis of non-doxastic states like desires, goals, wishes, and intentions. A belief that the restaurant is on 4th Avenue does not, by itself, cause me to walk to 4th Avenue. To perform this action, I need, at least, some motivational state – say a desire to have dinner at the restaurant. This is why, in traditional action theory, my behaviour would be explained both by the belief and the desire about the restaurant. And perhaps less obviously, we use imagination to consider possibilities and often factor those possibilities into a decision. In renovating my home, I imagine various construction and decoration projects and, only after contemplating those imagined circumstances, I begin some of those projects. Additional distinctions might be made here to further categorize these non-doxastic states. Suffice it to say that for our purposes, on a more liberal construal, these non-doxastic states are also properly understood as thought or cognition.

The reader will note that these mental processes and types do not exhaust the full variety of human mental activity. For example, we can form mental imagery, and this seems to have features of both perception (for example, visual imagery is subjectively similar to visual perception) and of cognition (for example, we use imagery to reason about, and act on, the world). Emotional states, too, are difficult to categorize. They have traditionally been treated as non-cognitive (from Socrates to, at least, Descartes), while they enjoy rich phenomenology without always being bound to sensory perception.

Those outstanding questions (and others) to one side, this initial analysis provides some sense of which mental states and processes are typically categorized as perceptual and which cognitive. The first list will include

at least vision, audition, touch, taste, olfaction, and proprioception. The second list will include belief, memory, judgment, desire, reasoning, and decision-making. We want to consider why the lists look as they do, and how or whether cognition and perception are distinguished as such, and how they are the same and how they are different.

1.2 The importance of cognitive influence on perception: an initial gloss

Determining those similarities and differences is foundational to understanding the importance of possible cognitive effects on perception. That is the topic of the next two sections. Before coming to that, though, we might ask why it matters. What is the importance of the cognition/perception distinction, and how might the first affect the second in interesting ways? What counts as “interesting” will be discussed in richer detail later (especially in Chapter 4). For now, here is an intuitive sketch of some ways that cognitive effects on perception might be of significant importance.

The importance of cognitive effects on perception can be largely gleaned from the importance of perception. What do we use seeing, hearing, and other forms of perceiving for? This is not, on its face, a deeply theoretical question. It doesn't take a philosopher or a cognitive scientist to identify good answers. We use perceiving to know about the world around us, to better understand it, and to act on it and in it. If you cannot somehow perceive the objects and events in your environment, you cannot successfully act upon them. The information we acquire through the senses is integral to action. This connects with the first of two epistemic roles of perception. Successful action and action planning require accurate and reliable information about one's environment. Thus, again intuitively, perceiving serves to provide us knowledge about the world. Some of this knowledge is codified in systematic ways, forming general principles, explanations, and predictions for worldly events. Perception also importantly serves here: We use it to make many of the observations that allow us to form and test scientific hypotheses.

These are intuitive and undeniable points about the role that perception plays in enabling everyday knowledge and scientific knowledge and in determining action and action potential. Given these roles and their importance, why might cognitive influence on perception matter? Here, too, some common-sense observations provide an intuitive starting point. You use vision and other senses to find out about and, in the best cases know

about, the world. Crudely, seeing leads to knowing. Knowing can also lead to seeing; for instance, if you know where your partner is, you can put yourself in a position to see their face. But what about a case in the vicinity, where you believe or expect, say, your partner to be upset and as a result of that background cognitive state see them as being upset? This would seem to threaten the trustworthiness of perception in providing you knowledge about your partner's emotional state. Or imagine a more positive case, one where because of your experience and knowledge of certain kinds of faces, you are better able to individuate instances of that kind. Here cognition would seem to improve your perceptual ability to make discriminations and, in turn, improve your ability to know about the things discriminated.

This general epistemic importance of possible cognitive influence on perception has an analogue in scientific investigation. If a scientist perceives in ways influenced by her theoretical commitments, then how can we be sure that those observations are providing genuine corroboration of her hypotheses? Again put crudely, good science requires that the observation tests the hypothesis; this evidential relation may be strained if the hypothesis antecedently biases the observation. This is especially salient when two scientists disagree about the explanation of some phenomenon and their respective perception of that phenomenon is infected by their distinctive theoretical commitments. It would seem that observation may thus not serve to resolve their dispute and enable a rational choice of theory.

Finally, what of the behavioural role of perception? What consequences might cognitive influence on perception have here? Consider activities that are highly cognitively demanding. On one quantification – the “Shannon number” – the number of possible moves in a typical game of chess is 10^{123} .⁴ Chess games can take a long time, but they have a finite conclusion with one player winning. What if a chess master, given her experience with and understanding of the game, better perceives important patterns in a chess game, especially given the massive array of possible moves? Plausibly, this would in turn better enable her to make successful moves, some of them very efficiently, in that game. Or consider sports that, at an elite level, require extremely rapid response times of their players: returning a 120-mph tennis serve, blocking a short-range penalty shot in hockey, hitting a 95-mph fastball in baseball. If the elite athlete's expert understanding and strategy could influence their visual perception of these features of the game, this would well explain why or how they are able to do something that only a tiny portion of the human population can do. Cognitive influence on perception thus could enable and enhance exceptional behavioural performance.