

# Common sense about qualities and senses

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**Abstract** There has been some recent optimism that addressing the question of how we distinguish sensory modalities will help us consider whether there are limits on a scientific understanding of perceptual states. For example, Block has suggested that the way we distinguish sensory modalities indicates that perceptual states have qualia which at least resist scientific characterization. At another extreme, Keeley argues that our common-sense way of distinguishing the senses in terms of qualitative properties is misguided, and offers a scientific eliminativism about common-sense modalities which avoids appeal to qualitative properties altogether. I'll argue contrary to Keeley that qualitative properties are necessary for distinguishing senses, and contrary to Block that our common-sense distinction doesn't indicate that perceptual states have qualia. A non-qualitative characterization of perceptual states isn't needed to avoid the potential limit on scientific understanding imposed by qualia.

**Keywords** Senses · Modalities · Qualia · Perception

## 1 Introduction

What are the limits on scientific understanding of perceptual states? One common way of addressing this question is to consider the problem of the explanatory gap. Even assuming that perceptual states are physical states, the problem remains as to whether there can be an explanation of the qualitative properties of perceptual states in scientific terms. Some theorists, for example, Block (1995, pp. 380–382) claim that we should characterize the qualitative properties of perceptual states as *qualia*, that is, as mental properties of

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perceptual states which are what it is like to be conscious of qualitative properties. These theorists claim that qualia at least resist explanation in scientific terms, and allow that the problem of the explanatory gap might always be a serious epistemological problem. Consequently, qualia mark at least a potential limit on scientific understanding of perceptual states.

Much ingenuity has been devoted to arguments attempting to show that perceptual states do or don't have qualia. Recently, attempts along these lines have taken up the question of how we distinguish sensory modalities.<sup>1</sup> For example, Block (1996, p. 28) has suggested that our drawing of common-sense distinctions among sensory modalities indicates that perceptual states have qualia. Thus, the issue of distinguishing the senses might offer the basis for a new argument for qualia.

However, at another extreme, Keeley (2002) argues that our common-sense way of distinguishing the senses in terms of qualitative properties is misguided, and offers a scientific eliminativism about common-sense sensory modalities which avoids appeal to qualitative properties altogether. This eliminativism about the common-sense senses could make way for a non-qualitative characterization of perceptual states which avoids the potential limit imposed by qualia. [Strictly speaking, Keeley claims that qualia have no scientific characterization, not that we shouldn't attribute qualia to perceptual states. Nevertheless, Keeley isn't suggesting dualism. Consequently, his admission that we needn't avoid attribution of qualia (2002, p. 27) is evocative of Quine's double standard (1960, pp. 219–221), by suggesting that attribution of qualia, while not scientifically acceptable, is still practically indispensable.]

Considering these opposing claims, we can use the issue of how we distinguish the senses as a vantage point (among many) from which to consider (if not settle the question of) what limits, if any, circumscribe scientific understanding of perceptual states.

I'll argue that considerations about distinguishing the senses provide no new argument for qualia. I'll contend, contrary to Keeley, that common sense is correct that qualitative properties are necessary for distinguishing senses. But, contrary to Block, I'll argue that our common-sense distinction doesn't support the claim that these qualitative properties are qualia. Thus, a non-qualitative characterization of perceptual states isn't needed to avoid the potential limit on scientific understanding imposed by qualia.

In Sect. 2, I'll describe two general strategies for distinguishing senses: a common-sense strategy which relies on qualitative properties and an eliminativist one which denies that qualitative properties are necessary for distinguishing senses. Keeley's (2002) attempt to provide individually necessary and jointly sufficient conditions stated in non-qualitative terms provides an example of the eliminativist option. Moreover, Keeley's eliminativism, because it is motivated by a concern to propose a concept of sensory modality general enough for use by neuroethologists and comparative biologists with respect to non-human animals, requires serious consideration. In Sect. 3, however, I'll show Keeley fails to demonstrate that qualitative properties are dispensable in distinguishing senses.

In Sect. 4, I'll offer a minimalist account for distinguishing senses. According to this account, qualitative properties are necessary for distinguishing senses, and, as well, the prospects are poor for building on this single necessary condition to establish

<sup>1</sup> In the last few years there has been growing interest in this issue; recent papers largely or exclusively devoted to it include Lopes (2000), Ross (2001), Keeley (2002), Noë (2002), Nudds (2004), and Gray (2005), as well as the papers presented at "Individuating the Senses," Centre for Study of Perceptual Experience, University of Glasgow, December 4–5, 2004 (which will be collected in a forthcoming volume edited by Fiona Macpherson).

independently necessary and jointly sufficient conditions. (Thus, despite having a necessary condition, there might be no formula for sufficiency. Senses are not unique in this way; we have necessary conditions for knowledge, but perhaps no formula for sufficiency.)

Yet, even though qualitative properties are indispensable in distinguishing senses, we need not characterize qualitative properties as being qualia. In Sect. 5, I'll argue that the necessity of qualitative properties in distinguishing senses does not found a new argument for a potential limit on scientific understanding of perceptual states. As a result, although the issue of distinguishing the senses allows us to reject eliminativism, it leaves us looking for other ways to settle the debate about qualia.

## 2 Strategies for distinguishing senses

I'll first set the stage by describing what I take to be the default view about distinguishing senses; I'll call this the core common-sense view.

*Core common-sense view:* If a sense is distinct, it produces perceptual states characterizable by a distinctive qualitative determinable (such as color for vision).<sup>2</sup>

This view doesn't attempt to give a full account of individuation conditions for distinguishing senses. In its provision of a single necessary condition, the core common-sense view says nothing about whether there are additional necessary conditions and it says nothing at all about sufficient conditions for distinguishing senses. (In Sect. 4, I'll argue that this single necessary condition is in fact the only plausible necessary or sufficient condition.)

Furthermore, the core common-sense view abstracts from the metaphysics of qualitative determinables—that is, the question of whether colors and sounds are, for example, properties of physical objects or properties of mental states. (I'll use the term “qualitative determinable” rather than “qualitative property” for ranges of qualitative properties such as colors. This usage helps emphasize that it is ranges of qualitative properties that the core common-sense view claims are necessary for distinguishing senses. Also, I'll use the term “qualitative determinable” when I intend for my usage to be neutral with respect to metaphysics.) According to this view, we distinguish among senses by way of distinctive qualitative determinables (such as colors and sounds), whatever the metaphysics of these properties might be.

This abstraction from the metaphysics of qualitative determinables reflects the fact that common sense doesn't offer a claim about this metaphysics. For example, common sense doesn't claim that colors are mind-independent properties of physical objects. While it might be a bit of common sense that the red of a fire engine is a mind-independent property of the fire engine (although even this doesn't offer a claim about metaphysics since it's not

<sup>2</sup> It might seem that synaesthesia shows that there are no such distinctive qualitative properties. Synaesthesia is a rare condition where a property distinctive of one modality supposedly is perceived through another modality; for example, in one manifestation, colors supposedly are heard. If colors really can be heard (and sounds can be perceived by a modality other than hearing, and so on), then it seems that the core common-sense view is false. It's difficult to tell, though, if synaesthesia really does indicate that color is not distinctive of vision, or if, instead, certain colors are merely associated with certain sounds. A suggestion in favor of mere association is that particular color–sound pairings are idiosyncratic. Cytowic points out, “Scriabin and Rimsky-Korsakov, for example, disagreed on the color of given notes and musical keys” (1995, p. 26). Admittedly, this point is not decisive. But, as well, our current understanding of synaesthesia is too murky to decisively reject the core common-sense view.

clear what common sense makes of the concept of mind-independent property<sup>3</sup>), it's not clear at all what common sense has to say about the red of an afterimage of the sun. Tye's contention (2000, p. 147) that common sense claims that colors are mind-independent properties is plausible largely because he focuses on the colors of ordinary physical objects. However, if we consider a broader range of colors—including afterimage colors, for example—common sense offers no position. Thus common sense offers no claim about the metaphysics of colors *tout court* (which is not to say there aren't *theoretical* claims about the metaphysics of colors *tout court*, or that there isn't a theoretical justification for the claim that colors *tout court* are in fact mind-independent properties of objects).

Thus, the core common-sense view is incomplete in various ways. Nevertheless, it is useful in that it serves to clarify the crucial difference between a common-sense strategy for distinguishing senses which relies on qualitative determinables, and an eliminativist strategy which claims that qualitative determinables are not necessary. Indeed, the core common-sense view is precisely what eliminativism rejects.

Keeley (2002) proposes an eliminativism about common-sense sensory modalities in the spirit of W.V. Quine's eliminativism about propositional attitudes. I take this spirit to be that we should reject common-sense mental entities that are specified in terms of a property for which there is no scientific account, and that in the place of these common-sense entities we offer a scientifically acceptable substitute. According to Keeley's eliminativism with respect to common-sense sensory modalities, we should reject the common-sense modalities specified in terms of qualitative determinables. And in their place, he offers behavioristically characterized substitutes. Moreover, he claims (2002, pp. 6–8) that we must make a move to eliminativism in order to specify a scientifically useful concept of sensory modality which neuroethologists and other perceptual scientists can apply to non-human animals.

To this end, Keeley proposes four criteria—which are intended to shun qualitative determinables—as being independently necessary and jointly sufficient for distinguishing modalities:

- (1) distinctive external physical conditions, particularly distinctive stimuli—for example, electromagnetic radiation for vision and pressure waves for hearing (a criterion which Keeley labels *physics*);
- (2) distinctive sense organs, including their connection with the brain (labeled *neurobiology*);
- (3) distinctive abilities “to discriminate behaviorally between stimuli” (labeled *behavior*); and
- (4) distinctive evolutionary or developmental importance of a putative modality (labeled *dedication*).

To further support his eliminativism, Keeley also denies that the following common-sense criteria are necessary:

- (5) distinctive physical qualitative properties of objects (for example, color for vision, flavor for taste, and so on), the *proper sensible* criterion,<sup>4</sup> and

<sup>3</sup> For example, common sense doesn't address the question of whether mind-independence requires that properties *not* be dispositions to produce psychological states in particular circumstances.

<sup>4</sup> Keeley calls this the proper object criterion; I'll use the label “proper sensibles” to underscore that they are properties, not objects. As Keeley notes, the idea of distinguishing modalities on the basis of distinctive qualitative properties of objects goes back to Aristotle. For historical background, see Sorabji (1971).

- (6) distinctive introspectible mental qualitative properties of perceptual states, the *distinctive quale* criterion.<sup>5</sup>

I'll argue, however, that Keeley's attempt to avoid an appeal to qualitative determinables fails. I'll show that a scientifically useful concept of modality need not be shorn of qualitative specification. To the contrary, Keeley underestimates how effectively science, in particular psychophysics, can shore up the core common-sense view.

### 3 The indispensability of qualitative determinables

#### 3.1 Distinguishing senses through multidimensional scaling

Indeed, psychophysics is the first place that a scientifically informed supporter of the common-sense distinction will look. As Clark (1993, Ch. 5) points out, psychophysicists employ the techniques of multidimensional scaling (MDS) for scientific investigation of the sensory modalities of non-human animals as well as human beings.

Multidimensional scaling is a set of statistical techniques which can generate a spatial representation of the relative qualitative similarities among a range of qualitative properties such as colors, where relative qualitative similarities are gauged in non-human animals by techniques such as stimulus generalization tests. (*Stimulus generalization* refers to a psychophysical effect in which the strength of a conditioned response grades off as the stimulus increasingly differs from the original conditioned stimulus.) And in particular, given data for the relative qualitative similarities among a range of properties, MDS generates dimensions along which qualitative properties are ordered. Thus, using MDS we can map out what is called a psychological quality space for that range of qualitative properties.<sup>6</sup>

The psychological quality space that's most commonly discussed is the psychological color space, with dimensions of hue, saturation, and lightness. This quality space orders colors with respect to relative qualitative similarity along these three dimensions; for example, it represents that: orange is more similar in hue to red than it is to green; fire engine red and pale pink are determinates of red which differ with respect to saturation; and pale pink and maroon are determinates of red which differ with respect to lightness.<sup>7</sup>

Multidimensional scaling allows us to use behavioral data from human beings or non-human animals to address whether a candidate modality perceives qualitative determinables at all, and, if so, whether it has a distinctive qualitative determinable. In particular, MDS provides the following characterization of qualitative determinables: a determinable property  $D$  is a *qualitative determinable* of perception (thus setting aside properties of states such as pain) if and only if its determinates  $D_1, D_2, \dots, D_n$  can be ordered into a psychological quality space (that is, an  $N$ -dimensional order in which the ordering is owing

<sup>5</sup> Keeley calls this the sensation criterion.

<sup>6</sup> For an extremely clear and detailed description of MDS, see Clark (1993, pp. 76–101, 210–221). Clark's discussion p. 75 and pp. 76–101 notes that this technique is indebted to Nelson Goodman's *The Structure of Appearance* (1977).

<sup>7</sup> From the standpoint of Johnston's (1992) five core beliefs about color, psychophysics meshes with what Johnston calls Unity, that is, the belief that determinate colors are located in a network of qualitative similarities. Johnston's other core beliefs [aside from the belief he calls Revelation, which, at least on one interpretation is dubiously a common-sense belief at all (Ross, unpublished manuscript)] have specifically to do with the colors of ordinary physical objects, rather than colors *tout court*. Perhaps the only claim that common sense offers about colors *tout court* is Unity.

to simple relative similarity—that is, similarity not dependent on similarities among simpler properties).<sup>8</sup>

Furthermore, MDS makes precise what is meant by being a member of an ordering of determinates: a property is a member of an ordering of determinates if and only if there is a *qualitative resemblance route* from it to any other determinate in the ordering; a qualitative resemblance route is a span of determinates which is continuous in that points along the span which are sufficiently close are indiscriminable, even though points farther apart are discriminable. So, for example, there is a qualitative resemblance route from a determinate red to any other color determinate, but there is no such route from a determinate red to C-sharp.<sup>9</sup>

With this characterization of qualitative determinable in hand, MDS can help us tell whether a candidate modality has a distinctive qualitative determinable. Again color provides a useful example.<sup>10</sup> MDS can help us find out whether an animal uses a candidate modality to perceive color, and, if so, whether it is distinctive in this respect.

First, MDS can help us determine whether an animal perceives a qualitative property with a psychological space akin to the human color space, where by “akin” I mean to include psychological spaces with greater or fewer dimensions than the human color space, but which nevertheless overlap it—such as a one-dimensional gray-scale space. (We can conceive of an overlap between psychological quality spaces as involving a qualitative resemblance route from one to the other; see Thompson, 1995, pp. 273–276 for a helpful discussion this point.) This psychophysical evidence along with findings from other sciences such as physiology and genetics provide at least a partial case for the claim that the animal perceives color. (For the relevance of evidence from physiology and genetics, see Bradley & Tye, 2001, pp. 471–475; Hardin, 1993, pp. 145–154; Thompson, 1995, Ch. 4. These authors also stress the challenge of attributing color perception to other species, considering the incompleteness of our evidence in these sciences. Even so, they all claim that such attributions will become empirically testable given more evidence.)

Then, if this (currently) partial case can be made, similar evidence with respect to other candidate modalities can help us find out whether the animal uses only the candidate in question to perceive color.

I’ll next argue that psychophysics shows that qualitative determinables are necessary for distinguishing senses, and, consequently, that Keeley’s eliminativism fails. Keeley averts our attention from the role of psychophysics in supporting common sense by subsuming psychophysics under his behavior criterion [criterion (3)].<sup>11</sup> However, psychophysics in general, and the use of MDS to generate psychological quality spaces in particular, does

<sup>8</sup> The qualification that similarities be simple avoids counting relative similarities amongst, for example, cars, as orderable into psychological spaces, and thus counting carhood as a qualitative property (Clark 1993, p. 79, pp. 91–94, 117–119).

<sup>9</sup> Qualitative relations among more determinable properties, such as red and orange, can be thought of as relations among regions of a quality space, where a region includes a number of determinates which are contiguous.

<sup>10</sup> Although similar points could be made by using other distinctive qualitative determinables such as sound.

<sup>11</sup> In addition, Keeley (2002, pp. 15–16) tries to show that psychophysics in fact meshes badly with our common-sense concept of a sensory modality, and thus that psychophysics can’t support the common-sense concept in any case. Yet, Keeley’s claim that there is a bad mesh between psychophysics and common sense is not well supported. He assumes that the lack of a qualitative resemblance route between qualitative properties (such as red and moving left to right across the visual field) is necessary and sufficient for distinguishing senses. As Keeley shows (2002, p. 16), this assumption produces results counter to a common-sense concept of a sensory modality. But Keeley gives no reason to accept this assumption. Instead, the way to mesh psychophysics and common sense is as according to the core common-sense view: a qualitative determinable *distinctive* of a modality (thus not spatial properties such as motion) is merely *necessary* for distinguishing senses.

not merely study behavior, but rather uses behavioral evidence to study qualitatively characterized sensory responses to stimuli.

### 3.2 Modalities without qualities?

Keeley presents his main argument for eliminativism about common-sense modalities against the distinctive quale criterion [criterion (6)] in particular. However, although it targets the necessity of the distinctive quale criterion, this argument could easily be modified to target the necessity of the proper sensible criterion as well; indeed, its target is best thought of as the core common-sense view.

There could be, Keeley contends, sensory modalities that produce states that can't be characterized in terms of qualitative determinables at all,<sup>12</sup> taking as an example the possibility that human beings have a vomeronasal system which perceives pheromones. The upshot is that qualitative determinables are not necessary for distinguishing sensory modalities, and the common-sense concept of sensory modality goes by the wayside.

This argument vividly captures the difference between the common-sense and eliminativist strategies. Since Keeley's necessary and sufficient conditions don't seem to eliminate the human senses of, for example, vision and hearing (and don't seem to be intended to do so), his eliminativism might appear to be an idle view—an eliminativism about common-sense modalities without elimination. Yet considering the argument for modalities without qualities, it becomes clear that the main result of a non-qualitative characterization of senses would be to expand their number, even while recognizing at least some familiar senses in somewhat unfamiliar terms.

Nevertheless, I'll show that there are reasons to hold that perceptual states must be characterizable in terms of qualitative determinables. Take the possibility of a human vomeronasal system.<sup>13</sup> If human beings have such a system, then either it produces states that can be ordered into a psychological quality space or it doesn't. But Keeley's argument runs into problems either way.

If states of the vomeronasal system can be ordered into a psychological quality space (involving a qualitative resemblance route along at least one dimension), then the vomeronasal system produces qualitative states. In this case, Keeley has failed to provide an example of a modality without qualities.

If vomeronasal states cannot be ordered into a psychological quality space, however, Keeley's example is vulnerable to the objection that they are not perceptual states at all but rather non-mental physiological states (such as states of dilation and constriction of the pupils).<sup>14</sup>

<sup>12</sup> In this argument, Keeley's target is qualia, which, following the typical characterization, he takes to be necessarily conscious. I'll argue that mental qualitative properties are not necessarily conscious in Sect. 5. In the meanwhile I'll respond to Keeley's argument in a way that doesn't assume that mental qualitative properties are necessarily conscious.

<sup>13</sup> For an engaging discussion of the possibility of a human vomeronasal system, see Hughes (1999, Chs. 18–19).

<sup>14</sup> However, by contrasting perceptual states with non-mental physiological states, I don't mean to suggest that perceptual states are not physiological. I assume that biological creatures' perceptual states are a subcategory of their physiological states. Thus, for example, states of dilation and constriction of the pupils (which function to control the amount of light that hits the retina) are physiological states that are not mental states. It is worth noting that although it is standard to define perceptual states as being qualitative states, I cannot, without begging the question, appeal to this definition. Instead, my strategy will be to defend the characterization of perceptual states as being qualitative states on (largely) empirical grounds, and then lay down the gauntlet for Keeley to provide an alternative characterization.



Keeley notes “...the vomeronasal sense seems akin to an olfactory version of blindsight” (2002, p. 25). (Due to damage to the primary visual cortex, blindsight patients have a scotoma—and so a lack of consciousness—in a portion of the visual field, but nevertheless can make guesses about what’s contained in that portion of the visual field with an accuracy above chance. So Keeley’s suggestion is that there might be vomeronasal perception which does not involve qualitative consciousness, just as there is visual perception which does not involve qualitative consciousness, at least in blindsight. See Palmer, 1997, pp. 633–636 for a brief background discussion of blindsight.)

While the comparison with blindsight suggests that vomeronasal states are mental, this comparison is misleading. Though it is uncontroversial that visual states are mental, the worry remains that, if states of the vomeronasal system have no quality space, they are not perceptual states but rather are non-mental physiological states. Assuming that for something to be a sensory modality it must produce perceptual states, if vomeronasal states aren’t perceptual, the vomeronasal system isn’t a sensory modality, and, again, Keeley has failed to provide an example of a modality without qualities.

Keeley’s basic claim is that there could be perceptual states that are not characterizable by qualitative determinables. However, even though perceptual states are not characterizable by qualitative determinables only, still there is reason to believe that perceptual states must be characterizable in terms of qualitative determinables.

Perceptual states are typically characterized by their causal roles in addition to being characterized by qualitative determinables. So, for example, perceptual states are characterized in terms of producing perceptual beliefs. Yet, if a state isn’t characterized by qualitative determinables, we are hesitant to allow that it produces perceptual beliefs. And this is reasonable given that a capacity to produce perceptual beliefs from states *not* characterized by qualitative determinables would seem to amount to a power of divination (for a similar claim, see Grice, 1962, p. 248). This point is in line with the fact that blindsight patients, who are not conscious of qualitative properties within blind regions of their visual fields, give no credence to their guesses about what’s contained within these regions.

Therefore, blindsight patients’ states lack aspects of the normal causal role of visual states in addition to lacking qualitative consciousness. The idea that blindsight patients have sight in their blind regions is plausible at all only because they can discriminate, with accuracy above chance, for example, shape, orientation, and location within these blind regions (Palmer, 1999, pp. 634–635). Consequently, despite patients’ lack of credence in their guesses, we attribute a form of sight to these patients due to the retention of other aspects of the normal causal role of visual states.

However, these retained aspects in fact fit with a characterization of blindsight patients’ visual states in terms of color—so long as this characterization need not be given in terms of qualia, that is, mental qualitative properties that are necessarily conscious (that this characterization needn’t be given in terms of qualia will be the burden of Sect. 5). And, more generally, there is no evidence to suggest that vision is possible without perception of (chromatic or achromatic) color. (In this context, I am taking color to be a paradigm case of what Keeley has in mind by a quality, or, in my terms, qualitative determinable. If spatial properties are also considered to be qualitative determinables, then his claim that perceptual states are not characterizable by qualitative determinables is even less plausible.)

With respect to the general point, normal visual perception of spatial properties is inseparable from perception of (chromatic or achromatic) color. While there are known to be so-called illusory conjunctions of colors and spatial properties, where normal visual perceivers switch the properties of objects (for example, the colors of letters in an array)



visually perceived at short exposure times (Treisman, 1996), there are no cases of visual perception of spatial properties independently of *any* chromatic or achromatic color.

Also, while brain injury resulting in acquired achromatopsia involves a loss of color perception without loss of visual perception of depth, motion, or form, it is chromatic color perception which is selectively lost; achromatic vision is retained (Davidoff, 1991, Ch. 3).

As for the specific point regarding blindsight, even though blindsight patients do not spontaneously identify color when forced to guess, for example, shape, they do discriminate chromatic color with accuracy above chance when forced to guess chromatic color (Weiskrantz, 1997, p. 23). Moreover, there is evidence that the pathways which are proposed as processing spatial properties in blindsight—the geniculostriate visual pathway and collicular pathways—also process (chromatic or achromatic) color. The geniculostriate pathway processes both chromatic color and spatial properties such as orientation and form independently of the primary visual cortex (Boyer, Harrison, & Ro, 2005); as well, collicular pathways process achromatic color (but not chromatic color) (Boyer et al., 2005; Davidoff, 1991, p. 26).

Consequently, there is reason to believe that the inseparability of (chromatic or achromatic) color perception from spatial perception in normal vision carries over to the residual perception involved with blindsight. Even though blindsight might seem to show that some visual states are not characterizable in terms of color, the empirical evidence indicates that, in the case of blindsight as well as vision in general, perceptual states must be characterizable in terms of qualitative determinables.

Furthermore, in the context of considering our vomeronasal states, Keeley merely asserts that there could be perceptual states not characterizable by qualitative determinables. But for this assertion to be plausible, he must explain why we should count vomeronasal states as perceptual states—as opposed to non-mental physiological states—despite not being characterizable by qualitative determinables.

On Keeley's behalf, someone might argue that it is methodologically best to separate the behavior criterion from the criteria which involve qualitative determinables. After all, he is interested in a concept of sensory modality which applies to non-human animals, and it might seem we are never warranted to characterize non-human modalities in qualitative terms.

This methodological worry isn't compelling, however. The best explanation of other people's qualitative similarity classifications is that they have sensory modalities which can be characterized by qualitative determinables (either determinable properties of physical objects, or of mental states, or of both). Again, psychophysics doesn't merely study behavior, but rather uses behavioral evidence to make inferences about sensory responses characterized in qualitative terms. This point is particularly clear with respect to human perception. Yet it's not clear why it shouldn't apply to at least many kinds of non-human animals as well (where relative qualitative similarity classifications are gauged by such methods as stimulus generalization tests)—and particularly when the inference is also supported by findings from other sciences such as physiology and genetics.<sup>15</sup>

Also, while it is true that scientists and philosophers are hesitant to attribute conscious qualitative states to other species, this hesitancy is typically in recognition of the inadequacies of our current grasp of consciousness. And it may seem that these inadequacies enforce a *de facto* eliminativism. However, a *de facto* eliminativism doesn't provide reason enough for Keeley's in-principle eliminativism. And in Sect. 5, I'll argue that there's no reason to accept even *de facto* eliminativism.

<sup>15</sup> Since characterizability by qualitative determinables is a necessary, but not sufficient, condition for perceptual states, whether a state is perceptual—or even mental—would have to be addressed in terms of further considerations, for example, with regard to the state's production of further cognitive states. (I'm thankful to Keeley for suggesting that I make this general point.)

Keeley's contention that a scientifically useful concept of modality avoids qualitative determinables has the effect of drawing too sharp of a distinction between common-sense and scientific concepts. These concepts might diverge at points, and where they diverge it can be that common sense goes wrong in ways that science can identify and correct. For example, psychophysicists could find a vomeronasal quality space, and this would support the claim that there is a human vomeronasal modality (although it wouldn't be sufficient evidence that there is one). If it is a common-sense assumption that there isn't one, then psychophysics could provide reasons to think that this assumption is false.<sup>16</sup> Nevertheless, science supports the common-sense view that qualitative determinables are necessary for distinguishing senses. So there are some points of agreement as well, and the distinction between scientific and common-sense concepts of sensory modality is much blurrier than Keeley suggests. Agreement with Keeley's optimism about having a scientifically useful concept of sensory modality needn't bring eliminativism.

#### 4 A minimalist account

My positive account of sensory modalities ventures only as far as the core common-sense view, that is: if a sense is distinct, it produces perceptual states characterizable by a distinctive qualitative determinable. I'll argue that the core common-sense view is correct, and that the prospects are poor for building on it to establish independently necessary and jointly sufficient conditions for distinguishing senses. Yet all is not lost; I'll point out that a full account of individuation conditions is unnecessary for addressing the problem of the limits on a scientific understanding of perceptual states.

My response to Keeley's argument for modalities without qualities provides some support to think that the core common-sense view is correct. For according to that response, sensory modalities produce states that must be characterizable in qualitative terms (to be distinguishable from non-mental physiological capacities). But the core common-sense view claims more than this: it takes as a necessary condition for being a distinct sense that it produces states characterizable by a distinctive qualitative determinable.

Necessary conditions for distinguishing senses are conditions where it's not possible for distinct senses to violate the condition. For example: if having distinct physical stimuli is a necessary condition, then it's not possible for distinct senses to violate that condition (and thus have no distinctive stimuli). Another example: the core common-sense view claims that it's not possible for distinct senses to have no distinctive qualitative determinables, like color.

The core common-sense view presents a plausible necessary condition. Consider a modification of a Gricean thought experiment (1962).<sup>17</sup> Martians land on Earth. Oddly, they have two sets of what look like human eyes. These sets of eyes are identical in various

<sup>16</sup> So science could correct common sense with respect to what Nudds calls the counting question, "that is, why do we have five senses?" (2004, p. 31). In the case of a vomeronasal system, science could help to show that the underlying assumption of the counting question—that human beings have five senses—is false.

<sup>17</sup> I've modified the set up of the thought experiment: Grice's thought experiment assumes a difference in senses for which a difference in qualitative determinables is necessary. In contrast, I'll argue for the contrapositive: a sameness in senses for which sameness in qualitative determinables is sufficient. More importantly, I've modified how the thought experiment is used: in arguing for the core common-sense view, I make no assumption as to whether qualitative determinables are properties of physical objects or of mental states. In contrast, Grice uses the thought experiment to argue for the necessity of qualia in distinguishing senses.

respects: they are sensitive to the same physical stimulus, perceive the same set of determinables (colors and shapes, for example), and, in fact, they both look and function just like human eyes. Let's assume that the sensory capacities conveyed by these sets of eyes have the same evolutionary or developmental importance as well. It seems that the two sets of eyes are organs of the same sense.

Now let's consider another scenario where we hold constant that two Martian sense organs perceive the same set of properties (including the same qualitative determinables), but allow that these sense organs differ, as do the physical stimuli that these organs sense and the evolutionary importance of the sensory capacities of these different organs. Does it make sense to *distinguish* these senses on the basis of a combination of distinctive physical stimulus, distinctive sensory organ, and distinctive evolutionary importance, even while they perceive the *same* qualitative determinables? Or is perceiving the same qualitative determinables sufficient for being the same sense (the contrapositive of the claim that perceiving different qualitative determinables is necessary for distinguishing senses)?

Gray (2005) refers to an example relevant to this question: imagine a creature that perceives radiant heat by way of two infra-red sensitive pits located between its nose and eyes, and kinetic heat by contact with its body (excluding the infra-red sensitive pits). Furthermore, its capacities to sense radiant and kinetic heat (different kinds of energy from the standpoint of physics and so different physical stimuli) have different evolutionary importance (since the pits have evolved to detect prey). Nevertheless, if psychophysicists were to show that the creature's infra-red detecting states could be ordered in a way that overlaps its psychological quality space for temperature (that is, there is a qualitative resemblance route from an infra-red quality space to a temperature quality space), it would be plausible that in the cases of both radiant and kinetic heat the creature uses differently evolved organs of a single sense, touch, to perceive temperature.

However, if, instead, psychophysicists were to show that the creature's infra-red detecting states could be ordered in a way that overlaps its psychological quality space for (perhaps the black–white dimension of) color (and so, there is a qualitative resemblance route from an infra-red quality space to a color space), it would be plausible that the creature uses differently evolved organs of a single sense, vision, to perceive different parts of the electromagnetic spectrum. Either way, what's sufficient for being the same sense is a distinctive qualitative determinable—temperature or color. Thus, it's plausible that perceiving the same qualitative determinables is sufficient for being the same sense; consequently, it's plausible that perceiving different qualitative determinables is necessary for distinguishing senses.

The creature that Gray describes is in fact the pit viper. As Gray points out, neuroethologists distinguish the pit viper's pits and eyes as organs of different senses, and he conjectures that this is largely because these organs are used independently and have different evolutionary importance. However, there is no available psychophysical evidence either for or against either of the suggested overlaps. My claim is that if psychophysical evidence were to become available for one of the overlaps, this evidence would be plausibly decisive in classifying the pit viper's senses.

Moreover, while the core common-sense view presents a plausible necessary condition, there is no other; as it turns out, proposals of additional independently necessary conditions are unpromising.

Take physical stimulus. It seems we should characterize physical stimulus, for example, sound waves, in terms of physics. In that case, however, sound waves are a kind of pressure wave that is on the same spectrum as vibrations that can be felt. But then if physical

stimulus is independently necessary, hearing and touch are not distinct senses because hearing has no distinctive stimuli. That, I take it, is not plausible.

A way of getting around this problem is to characterize physical stimuli in terms of qualitative determinables—for example, to distinguish physical stimuli as sound waves because they are in a portion of a spectrum of pressure waves that has detectible pitch and loudness, dimensions of the quality space for sound. But then qualitative determinables are doing all the work, and adding the stimulus condition as independently necessary is superfluous.

The addition of either sense organ or evolutionary importance as an independently necessary condition is similarly vulnerable to the charge of being derivative of qualitative determinables. With respect to sensory organ, we characterize sense organs in terms of the distinctive qualitative determinables of the states they produce. For example, if the pit viper's pits are used to sense color, they are visual organs; if they are used to detect temperature, they are tactual organs. Again, distinctive qualitative determinables are doing all the work, and adding the sense organ condition is superfluous. So it seems that it's at least difficult to get a proposal of multiple independently necessary conditions off the ground.

And sufficient conditions are even more obviously difficult to come by. Distinctive qualitative determinables aren't sufficient for distinguishing senses: touch is associated with multiple distinctive qualitative determinables, for example, temperature and hardness.<sup>18</sup> But is this sufficient to claim that touch should be divided into multiple modalities? We can stipulate an answer, of course, but it's difficult to know how to do better. Consequently, as with knowledge, although we can establish a necessary condition, there might be no formula for sufficiency.

I'm not claiming to have decisively put to rest the idea of formulating necessary and sufficient conditions for distinguishing senses.<sup>19</sup> But I have tried to show that the prospects are poor. Thus, it's a strength of the core common-sense view if it can do substantial work without getting bogged down in a search for independently necessary and jointly sufficient conditions. And, in fact, by limiting its focus to the necessity of qualitative determinables in distinguishing senses, the core common-sense view can do substantial work. After all, the basic questions relevant to the problem of the limits on a scientific understanding of perceptual states are these: are qualitative determinables necessary for distinguishing senses? If so, are qualia necessary?

So far, I've addressed the first of these two questions: I've argued that qualitative determinables are necessary for distinguishing senses, and so Keeley's eliminativism fails. I'll now argue that qualia aren't necessary.

## 5 The dispensability of qualia

### 5.1 Qualitative determinables and consciousness

The core common-sense view is neutral with respect to the question of whether qualitative determinables are physical qualitative properties of physical objects or mental qualitative

<sup>18</sup> Texture (including the range of smoothness to roughness), which is perceived by touch, is not distinctive of touch, for texture is also perceived by sight; in fact, for a wide range of textures, touch and sight are about equally proficient in perceiving texture (Warren & Rossano, 1991, pp. 120–121, 129–132).

<sup>19</sup> Also I should point out that I am not denying that sensory modalities necessarily have *some* physical stimulus, perceived through *some* sensory organ which was developed through *some* evolutionary process. I think that is plausible. Rather what I am claiming is that difference in sensory modality doesn't imply difference in physical stimulus, and that candidates merely derivative of qualitative determinables aren't themselves necessary for distinguishing senses.

properties of mental states. And, in particular, the core common-sense view is neutral between Keeley's proper sensible and distinctive quale criteria.

However, in defending the core common-sense view against eliminativism, I've appealed to the claim that we needn't characterize perceptual states in terms of qualia, that is, as mental qualitative properties characterized in a certain way: as what it's like to be conscious of qualitative determinables. I'll support this further claim by describing an alternative way of characterizing mental qualitative properties which avoids marking a potential limit on scientific understanding of perceptual states, and by defending this alternative characterization in the remainder of this paper.<sup>20</sup>

According to the standard characterization of qualia in terms of what it's like to be conscious of color or smell or sound (or any other qualitative determinable), these mental qualitative properties are necessarily conscious. There must be something it's like to have them, where there being something that it's like requires consciousness.

Alternatively, I am suggesting that qualitative determinables can be characterized in terms of psychological quality spaces. In this case, mental qualitative properties (a kind of qualitative determinable) can be characterized in terms of quality spaces, and if non-human animals have perceptual states with mental qualitative properties, then we can infer them on the basis of behavioral evidence through use of MDS.

This way of characterizing mental qualitative properties avoids the issue of consciousness, since the mental qualitative properties which we infer are neural properties which need not be conscious. In the right neurophysiological context—so, for example, barring damage resulting in blindsight—these mental qualitative properties are conscious. But with regard to blindsight, we can still infer that blindsight patients have mental qualitative properties which process information contained in the blind spots of their visual fields on the basis of behavioral evidence—and in this case, these qualitative properties are not conscious.

An unconscious mental qualitative property may sound like an impossibility. After all, proponents of qualia define these mental qualitative properties as being necessarily conscious. However, as Rosenthal (1991, 2005a) argues, the idea the mental qualitative properties are necessarily conscious is unmotivated. Even common sense allows that mental qualitative properties need not be conscious (for example, common sense allows that a headache that dips out of consciousness doesn't thereby cease to exist).

Moreover, the alternative characterization in terms of psychological quality spaces allows us to set aside the question of qualitative consciousness while distinguishing senses in non-human animals (since it allows for qualitiveness without consciousness). Nevertheless, it retains the common-sense idea that perceptual states must be characterizable in terms of qualitative determinables. Consequently, unlike eliminativism, it doesn't leave us at sea with respect to how we characterize perceptual states as distinct from non-mental physiological states.

At the end of Sect. 3, I noted that, due to the inadequacies of our current grasp of consciousness, scientists and philosophers are hesitant to attribute conscious qualitative states to other species. This hesitancy may seem to amount to a *de facto* eliminativism. However, if we can distinguish between qualitiveness and consciousness as independent properties of perceptual states, there's no reason to accept eliminativism *de facto* or otherwise. For by drawing this distinction, we allow that perceptual states can be characterized in terms of a qualitative determinable (understood in terms of a psychological quality space) independently of consciousness.

<sup>20</sup> This alternative is described and defended at length in Rosenthal (2005a).

## 5.2 Grice's visiting Martians

So far I have argued against eliminativism (in Sect. 3) and in favor of a minimalist account of distinguishing the senses which ventures no further than the core common-sense view (in Sect. 4). And so far in this section, I have offered a way of characterizing the qualitative properties necessary for distinguishing senses which avoids characterizing them as qualia.

However, any such attempt to avoid qualia is controversial. In particular, there has been recent interest, due in part the result of a reconsideration of Grice's "Some Remarks about the Senses," in whether the problem of distinguishing senses shows that perceptual states have qualia. Grice claims it does—since, he argues, qualia are necessary for distinguishing senses.<sup>21</sup> There are, of course, other arguments for the existence of qualia. Yet, Grice's argument would provide a new and interesting way to make this case. Moreover, considering the importance of Grice's classic paper to the issue of distinguishing sensory modalities, I'm obliged to take up Grice's argument—not only from the standpoint of considering a rebuttal to my claim to have avoided qualia, but also from the standpoint of considering the value of the issue of distinguishing senses to the problem of what limits (if any) circumscribe scientific understanding of perceptual states.

I'll show, however, that Grice provides no new argument for qualia. Grice argues that qualia are necessary for distinguishing senses on the basis of a thought experiment: as it turns out, Martians have two sets of eyes which are sensitive to the same physical properties, and perceive the same sets of determinables (colors and shapes for example). Due to these similarities, it seems that the two sets of eyes are organs of the same sense. But, Grice continues, if we ask a Martian whether perceiving blue with one set of eyes is like perceiving blue with the other set, the Martian says "there is all the difference in the world" between these perceptual experiences, pointing out a qualitative difference.

Grice claims that we would conclude that the two sets of eyes are of different senses. Since physical stimulus, sense organ, and perceived properties of objects aren't sufficient for distinguishing these different senses, then, Grice argues, another condition—in particular, the distinctive qualia condition—is necessary. In "Some Remarks," Grice's main focus is the relationship between perceived properties of objects and qualia, and in particular to consider whether qualia are dispensable with regard to distinguishing senses; the point of the Martian thought experiment is to demonstrate that they aren't.<sup>22</sup>

Nevertheless, we can, perhaps, account for "all the difference in the world" in terms of consciousness of distinctive physical qualitative properties of physical objects perceived in

<sup>21</sup> The fact that Grice (1962, p. 259) stresses the diaphanousness—what is currently called the transparency—of experience is consistent with his arguing for qualia. For an incisive discussion of the complexities of the relationship between transparency and qualia, see Kind (2003). Furthermore, even though Grice himself doesn't use the term "qualia," instead favoring the term "introspectible character" throughout "Some Remarks," and using the terms "phenomenal character," and "experiential flavor or quality of experience" in his "Retrospective Epilogue," I'll follow the current convention and refer to such mental qualitative properties as qualia.

<sup>22</sup> In fact, Grice doesn't intend to propose independently necessary and jointly sufficient conditions for distinguishing senses. At best, Grice might suggest that distinct physical stimuli, sense organs, perceived properties, and qualia are disjunctively necessary for distinct sensory modalities. In that case, if a sense x-ing and a sense y-ing don't satisfy any of the disjuncts, then x-ing and y-ing are the same sense, and the Martian thought experiment is intended to show that the distinctive qualia condition is needed as an additional disjunct. [For further discussion of Grice on the senses, see Ross (2001). At this point, I think that the core common-sense view is much more plausible than the proposal I offered for distinguishing the senses in that paper.]

virtue of a range of mental qualitative properties.<sup>23</sup> These mental qualitative properties, in turn, 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. The qualitative determinables needed to distinguish senses are physical qualitative properties of physical objects together with mental qualitative properties that needn't be characterized in terms of consciousness. Physical qualitative properties of physical objects, as physical properties, pose no special difficulty for scientific understanding. Furthermore, mental qualitative properties, so long as they needn't be characterized in terms of consciousness, also present no special difficulty.

Because in the set up for the thought experiment Grice claims that the two sets of eyes perceive the same ranges of properties of objects, he seems to rule out the possibility of accounting for "all the difference in the world" by distinctive physical qualitative properties of physical objects. But this claim is question begging without independent support.<sup>24</sup> Consequently, Grice needs to provide independent support for thinking that we must account for "all the difference in the world" in terms of qualia.

However, he suggests just such independent support in his comments about the generic resemblance among perceptual states of the same sense.

### 5.3 Generic resemblance

Grice claims:

...the way to describe our visual experiences is in terms of how things look to us, and such a description obviously involves the employment of property-words. But in addition to the specific differences between visual experiences, signaled by the various property-words employed, there is a generic resemblance signaled by the use of the word "look," which differentiates visual from non-visual sense-experience. This resemblance can be noticed and labeled, but perhaps not further described (1962, p. 267).

Thus, visual experiences share a generic resemblance; auditory experiences share a generic resemblance; and so on. Grice intends for this point about generic resemblance to support his case for the claim that qualia are necessary for distinguishing senses. I'll offer an interpretation of what Grice has in mind, and state why this consideration doesn't indicate that qualia are necessary.

Visual experiences are distinctive in that they involve color. Consequently, a generic resemblance among visual experiences derives from a generic resemblance among colors; broadly speaking, a generic resemblance among the perceptual states of a modality derives from a generic resemblance among the qualitative properties that are distinctive of that modality. What Grice might have in mind is that each range of qualitative properties distinctive

<sup>23</sup> I argue for the existence of mental qualitative properties that are not characterized as qualia in "Fitting Color into the Physical World." However, this view offers only one way of avoiding qualia. A more common way is provided by intentionalist views which reject mental qualitative properties altogether (see, for example, Tye 2000).

<sup>24</sup> Bach (1997, pp. 466–467) offers the rejoinder that assuming that "all the difference in the world" *must* be accounted for in terms of physical qualitative properties is likewise question begging. My aim, however is merely to show that, without independent basis, we needn't accept an account in terms of qualia.



of a sense is a dispositional relation between a range of physical properties of physical objects and a distinctive range of qualia.

This proposal is a common version of dispositionalism about qualitative properties, according to which colors, for example, are dispositions of a range of physical properties of physical objects to produce color qualia. According to this kind of dispositionalism, we don't attribute qualia to physical objects. Nevertheless, we are indirectly aware of qualia through perception since they determine the qualitative character of properties (such as dispositional colors) which we do attribute to physical objects. Thus, they can make "all the difference in the world" in the perception of the properties of physical objects. Furthermore, qualia are, as Grice says, introspectible. In the case of the visiting Martians, the idea would be that, in addition to a blue quale which the two sets of eyes have in common, there is also a quale distinctive of each set (despite there being no distinctive physical qualitative property). Supporting this interpretation, Grice suggests that he favors this kind of dispositionalism in his "Retrospective Epilogue," (1989a, p. 343).

And perhaps the idea that different senses have distinctive ranges of qualia is what Block (1996, p. 28) has in mind when he remarks that considerations about distinctions among the senses provide a basis for accepting qualia.

Yet this line of reasoning for qualia is unconvincing. Psychophysics again provides a useful way of looking at the issue. If we can understand a generic resemblance among perceptual states in terms of a qualitative determinable, we can, in turn, understand this qualitative determinable in terms of a psychological quality space. Viewed this way, a generic resemblance among visual states amounts to our recognition that there is a qualitative resemblance route through the psychological color space from any color to any other color, but not to a sound. Furthermore, so understood, generic resemblance "can be noticed and labeled, but perhaps not further described" in the sense that our recognition that we can place any color in the psychological color space is a non-inferential recognition that we can't redescribe in other terms (at least not in other non-scientific terms).

But, if this interpretation of Grice is along the right lines, generic resemblance provides no reason to think that perceptual states have qualia. Although we think of the psychological color space in terms of conscious qualitative properties, we needn't take this point to suggest that perceptual states have qualia, that is, mental qualitative properties that are *necessarily* conscious. Instead, it might be that so-called conscious qualitative properties are physical qualitative properties of physical objects of which we happen to be conscious in virtue of mental qualitative properties; and that mental qualitative properties are neural properties inferred—whether they are conscious or not—through MDS-generated psychological quality spaces. So an understanding of generic resemblance in terms of a psychological quality space, rather than forcing us to accept qualia, offers an opportunity to avoid them.

To decide whether perceptual states have qualia, we should set aside the issue of how we distinguish sensory modalities, and directly address the question of whether mental qualitative properties are necessarily conscious. For, even if we assume that the core common-sense view is correct, support for qualia requires the additional claim that mental qualitative properties are necessarily conscious.

Thus, while a consideration of how we distinguish the senses tells against eliminativism, it leaves us where we started with respect to the question of qualia. Instead, the issue of qualia requires that we directly address the problem of the metaphysics and epistemology

of qualitative determinables such as color. But this is a discussion, as Grice (1962, p. 267) puts it, “for which at the moment I have neither time nor heart.”<sup>25</sup>

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<sup>25</sup> But see my “Fitting Color into the Physical World” for a development and defense of a proposal about the nature of color, in particular, a version of physicalism which avoids qualia. I owe many thanks to Keeley for helpful comments several drafts of this paper, including his commentary for a version presented at the 2005 APA Eastern Division meetings in New York. I also thank David Rosenthal, Pete Mandik, Doug Meehan, Josh Weisberg, Tony Dardis, Dion Scott-Kakures, Amy Kind, Peter Graham, and Carrie Figdor for helpful comments at presentations of this paper. I also owe many thanks to Kent Bach, Richard Gray, and an anonymous reviewer for thoughtful suggestions and criticisms on drafts of this paper, and to David Horner for help with understanding the psychophysics of touch.

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