

## CHAPTER 3

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**NON-VISUAL PERCEPTION**


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**3.1 INTRODUCTION: PERCEPTION  
BEYOND VISION**

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THIS chapter addresses perceptual consciousness beyond vision. An impressive reach of human perceptual consciousness is non-visual. From this perspective, it is odd that philosophers have so persistently focused on visual forms at the expense of others. This oversight has potential costs. Nothing guarantees that claims about perceptual consciousness or its phenomenology founded on vision alone generalize to non-visual ways of perceiving. Moreover, critical features may be missed by dwelling on vision. If we are after a general and comprehensive account of perceptual consciousness and its phenomenology, it is poor methodology to focus exclusively on vision.

This chapter aims to provide the background that is relevant to understanding and appreciating the significance of varieties of consciousness associated with other sensory modalities, such as hearing, touch, smell, and taste. Section 3.2 clarifies the target phenomena. Section 3.3 discusses the diverse characteristics of non-visual experiences in various sense modalities, describing distinctive features of experiences in several senses and how each compares with vision. It asks whether the prospects are good for a shared account of perceptual consciousness across the senses. Then, the chapter turns to multisensory forms of perceptual experience. Section 3.4 asks what unifies perceptual awareness among the senses, and it describes the consequences of several varieties of multisensory experience for theorizing about the structure of perceptual consciousness.

## 3.2 EXTRA-VISUAL PERCEPTUAL CONSCIOUSNESS

This chapter treats a relatively focused domain of consciousness: non-visual varieties of exteroceptive sense perception. Sense perception is a paradigm of human consciousness, and it plays a critical role in philosophical debates about the mind. It is the most vivid form of lived human consciousness, and it is illuminated by advanced scientific accounts of sensory processing. Sense perception impacts justification for empirical beliefs, and it guides world-directed action. Much of it extends beyond vision.

It is worth clarifying my target. First, the focus throughout this chapter is on conscious perception. Allow that some perception occurs subconsciously in otherwise conscious subjects. Perhaps information about an object or feature is registered psychologically in a way that impacts thought, emotion, or action. In such cases, the psychological impact of a process of registering information may warrant attributing perception. However, this does not occurrently impact the subject's present waking consciousness in a manner that could be noticed as such by the subject.

Some perception occurs consciously. A subject who is awake can consciously hear a sound, smell an odor, feel a textured surface, or taste bitterness. There is something it is like for the subject to undergo these perceptual episodes, and they typically are recognizable as such. Moreover, consciously perceiving typically provides reasons for belief and action that subjects can appreciate. This chapter's focus is on conscious perception.

The primary target is exteroceptive forms of perception, which involve perceiving things other than oneself. By this I mean to include candidates such as consciously seeing, hearing, touching, tasting, and smelling. First, there is disagreement about whether interoception counts as perception. Some philosophers hold that perceiving requires awareness of something in a manner that makes evident that it is distinct from the perceiving subject. Thus, pains and the sensation of hunger do not count as forms of perception. Awareness of the position of one's own body presents a difficult intermediate case, turning on whether the self is understood as purely psychological, in which case the body is distinct from oneself, or as including one's body. I propose to avoid these difficulties by focusing on exteroceptive perception.

Moreover, my discussion treats only sensory forms of perceptual consciousness. If there are other, non-sensory forms of conscious perception, such as perceptual consciousness of arithmetical, logical, modal, semantic, or moral objects or facts, this chapter at best informs their discussion. This chapter also does not consider the sorts of consciousness associated with emotions by accounts that treat them as forms of perception, whether interoceptive or exteroceptive (e.g., Prinz 2004).

This discussion aims to be neutral among philosophical theories of the nature of conscious perception, including those that may be classified as relationalist, adverbialist, or intentionalist, such as naïve realism, sense data theories, representationalism, or disjunctivism.

Furthermore, this chapter is neutral about whether or not there is a distinctive phenomenology of thought or cognition. If there is, that is a form of consciousness that is extra-perceptual. If there is not, it still may be that the phenomenology associated with thinking shares a format or character with consciously perceiving or sensing—perhaps it is sensory-affective, to use Galen Strawson's (1994) term. This chapter sets aside such forms of consciousness, along with conscious imagination and sensory memory, in favor of focusing on the varieties of consciousness to which such forms are compared. It treats only the sort of consciousness associated with occurrently perceiving or merely seeming occurrently to perceive, as in perfect philosophical hallucinations (see Kriegel 2015 for discussion of further varieties).

Finally, just because a conscious perceptual episode is auditory, tactual, gustatory, or olfactory does not preclude its being visual, or visual in some respects. It would be misleading to describe most multisensory episodes as non-visual, since, except in blindness, they typically involve seeing. A better description is extra-visual or other-than-visual perceptual consciousness. This chapter concerns forms of perception other than vision, rather than non-visual perceptual consciousness, strictly understood.

### 3.3 DIVERSITY ACROSS THE SENSES

Attention to the varieties of exteroceptive perceptual consciousness may raise doubts about the prospects for a unified account of their phenomenology, their contents, or their objects. What do catching a glimpse of a falling maple leaf, hearing the din of the refrigerator, or detecting a rancid smell all share?

#### 3.3.1 Features

The senses differ in which specific features they reveal. This is a difference in detail. Each sensory modality has its proper sensibles, features revealed in the first instance only by perceptual experiences belonging to that modality: colors for vision, pitches and timbres for audition, pressure and warmth for touch, scents for olfaction, and tastes for gustation. Each of these properties has a qualitative dimension that contributes a distinctive character to experiences of its corresponding sense modality. Some senses also reveal common sensibles, features that may be perceived through other modalities and for which there is not just one distinctive sense-specific qualitative character.

There is an open question about which sorts of features may figure in perceptual consciousness in each of the senses. For instance, many philosophers hold that humans visually experience causality, in part due to empirical research suggesting we visually detect causality and in part because this sensitivity is reflected in visual phenomenology (e.g., Siegel 2010). What about other senses? It is plausible that causality may be heard. Think of hearing screeching tires followed by a crash, a cracking branch followed by a

booming collapse, the trajectory of vocalizations during speech, sounds in a musical melody, or a sound and its echo. However, it is not clear that this extends to other senses. What is a compelling example of consciously perceptible causality in taste, smell, or even touch?

Two related issues concern the perception of semantic properties and kind properties. Some have argued that humans visually experience meanings or natural kind properties (e.g., Bayne 2009; Siegel 2010; Speaks 2015). It is intelligible that people could hear meanings when listening to speech, but typically we do not taste or smell semantic properties. Kind properties, however, are better examples of features that may be perceptible in other senses if they are perceptible in vision. Once you learn to recognize the sound of a viola in contrast with a violin, the scent of patchouli in contrast with citronella, the flavor of spearmint in contrast with peppermint, the feeling of velour in contrast with velvet, or the taste of brussels sprouts in contrast with broccoli, each may contribute to your perceptual consciousness in a way best explained by awareness of ‘higher-level’ kind properties, such as being a brussels sprout or being a viola.

Indiscernible confounds appear just like recognizable kind members but lack the relevant kind property. For instance, a wax figure could look just like a human. Beyond vision, too, indiscernible confounds present potential counterexamples to perceptual consciousness of kind properties as such. Unless you are prepared to say that hearing the sound of a perfectly synthesized viola or tasting a convincing synthetic brussels sprout compound involves a kind illusion, it may be that the best account of the character of auditory or gustatory consciousness does not appeal to the experience of kind properties. This instead suggests that perceptual experience associated with other senses reveals complex analogs to the typical visual looks or appearances of things that belong to specific kinds. These appearance analogs are aptly called sounds, smells, feels, and tastes.

### 3.3.2 Space

Structural differences across the senses have greater potential for revisionary consequences concerning perceptual consciousness. Space provides one example. Kant said space is the form of outer intuition, or sensory presentation. Accordingly, each modality of perceptual consciousness ought to be spatial. So, we can ask whether each sense involves spatial awareness. Furthermore, we can ask whether each of the spatial modalities is spatial in the same respects. For instance, we can ask whether each shares the same spatial structure.

Does each sense involve spatial awareness? Intuitively vision and touch are both spatial. You can see shapes, directions, distances, and movement. You can feel shapes, locations in the space you can reach with your body or a contact tool, and motion on your skin. On the other hand, taste itself, abstracted from touch, lacks spatial structure. At best, with the aid of touch, tastes seem located in food in the mouth. Orthonasal olfaction conveys more spatial information than taste. Active sniffing over time reveals

spatial features such as directions, locations, and boundaries of odors. But static olfaction in humans is a deficient or parasitic form of spatial consciousness. Olfaction in other creatures, such as dogs or hammerhead sharks, may be spatially richer.

Audition is more contentious. P. F. Strawson (1959) famously denied that hearing is inherently spatial. According to Strawson, a purely auditory experience would be non-spatial. Nudds (2001) and O'Shaughnessy (2009) share Strawson's skepticism about spatial audition. Nevertheless, some philosophers argue that hearing does have a spatial phenomenology and that humans hear sounds or their sources as located in some direction and at some distance (Pasnau 1999; O'Callaghan 2007; Casati and Dokic 2009). This claim is supported by contemporary research on locational hearing and auditory space, which details sophisticated spatial hearing capacities (e.g., Blauert 1997). An intermediate position is that hearing presents directions but not distances.

Human audition, however, differs from vision and touch in two noteworthy respects. First, its spatial resolution is poorer than vision's by an order of magnitude, and it provides neither the detail nor the accuracy of vision or touch. Directionally, audition is prone to errors in the cone of confusion, where interaural cues are ambiguous, and distance hearing suffers in reverberant environments because it relies heavily on secondary reflections. Second, auditory consciousness does not present its objects as having a richly detailed internal spatial structure. Sounds may seem located in three-dimensional space and to move or stand in spatial relations to each other; however, we do not typically hear things to have spatial parts that stand in spatial relations to each other, and humans generally do not resolve clear spatial edges or boundaries auditorily (O'Callaghan 2008). Nonetheless, we may hear volumes of space, such as the interior of a cathedral, a gymnasium, or a shower (Young 2017). Echolocators have uncommonly developed auditory spatial capacities (Thaler and Goodale 2016).

These differences in detail raise questions about the spatial structure of perceptual consciousness. Martin (1992) argues that vision and touch differ in spatial structure in the following respect. Vision is capable of presenting unoccupied locations as empty, but touch is not. Because touch requires contact (cf. Fulkerson 2014), you cannot feel the empty space in the middle of a donut itself as empty, but you can see the space inside the hole to be unoccupied. Thus, touch does not involve a spatial field in the same way vision does, as an array of distal objects appearing to occupy otherwise unoccupied space. Touch does not present things as filling space that extends beyond the body.

Nudds makes a similar claim about hearing. He maintains that audition, unlike vision, does not situate sounds in relation to the space they occupy. Nudds concludes that audition lacks spatial structure: 'I am attempting to draw attention not merely to the fact that the auditory experience has a different spatial structure, but that it has a structure that is non-spatial' (Nudds 2001: 213).

One important question concerns whether or not spatial experience in one sense ever depends on spatial experience in another. For instance, a Berkeleyan might contend that three-dimensional visual spatial awareness depends on touch. Strawson maintained that the spatial characteristics of typical, mature auditory experience depend on the inherently spatial modalities, vision and touch.

### 3.3.3 Objectivity

Spatial characteristics of consciousness across the senses bear on whether or not a sense counts as a perceptual modality. Some philosophers hold that spatial awareness is required for apparent objectivity and that such objectivity is necessary for consciousness to count as exteroceptive and thus as perceptual. The idea is that perception presents its objects as independent from oneself and one's experiences or states of consciousness.

Space is a Kantian requirement on objectivity. Objectivity requires being aware of a thing or feature in a manner that encodes or appreciates that its existence does not depend on being perceived. Strawson (1959) interpreted this to require that subjects must be able to experience places where a thing could be or exist even while it is not being perceived, thus enabling reidentification. Suppose, with Strawson, that vision and touch are inherently spatial. Taste and smell, however, may not meet the spatial requirement on objectivity, and thus may not count as fully perceptual. Perhaps they do not make room on their own for the distinction between self and non-self (see also Burge 2010).

According to the Strawsonian account, in which audition is not inherently spatial, a purely auditory experience does not furnish the materials for spatial concepts, and thus audition all on its own does not count as a fully perceptual form of consciousness. Nonetheless, Strawson holds that mature hearing in the context of other senses does involve awareness of locations, so audition embedded among inherently spatial senses may amount to perceptual consciousness and full-fledged hearing. Something similar might hold of other senses, such as olfaction and taste, in multisensory contexts.

Beyond disputing the spatial status of a sense, or recognizing the spatial dependence of one sense on another, one might challenge the Kantian requirement on objective experience. We should clearly distinguish the spatial and mind-independent notions of 'out there.' Apparent distal location and apparent objectivity could come apart. Afterimages may seem distally located but experience-dependent, and perhaps olfaction is objective but non-spatial (see Smith 2002: ch 5). For instance, apparent objectivity may require only the capacity to discern experiential changes that result wholly from changes to oneself—mere experiential changes—from experiential changes resulting from changes to that of which one is aware. This criterion has a significant benefit: it can be investigated by studying perceptual constancies (cf. Burge 2010).

### 3.3.4 Objects

The structure of perceptual consciousness may vary in other respects across perceptual modalities. One such respect concerns apparent objects and their features. For instance, seeing involves visually experiencing objects, their parts, and their properties.

Some maintain that visual consciousness has a predicative structure, in which features are attributed perceptually to objects (e.g., Clark 2000; Matthen 2005). Predication

involves something akin to judgment or entertainment, and it entails having truth conditions. My view is that it is wrong to think of the visually apparent relation between visible attributes and visible objects as that of predication. Instead, objects appear to bear or to instantiate features. In either case, one perceptually experiences objects and the features that appear to qualify them. This is an aspect of the structure of visual consciousness. Furthermore, it is an aspect of vision's structure that it can involve consciousness of multiple objects at a time that appear distinct from each other.

Accordingly, one question about each non-visual sense is whether or not the features it reveals appear to be attributed or to belong to perceptible objects. For instance, taste on its own might be thought to reveal the sensible qualities of saltiness, bitterness, sourness, sweetness, and umami, without itself ascribing them to individual objects. Batty (2011) argues that olfaction differs in this respect from vision. First, Batty contends that olfaction's content is existentially quantified in structure. Olfaction reveals properties, and it reveals them as instantiated, but olfactory experience does not represent individual objects that appear olfactorily to bear the features you smell. Second, according to Batty, olfaction is incapable of distinguishing distinct items to which features belong. So, you only smell that something is smoky, sweet, and citrusy. You cannot smell that something is smoky and sweet while something else is citrusy. Olfactory content employs only one quantifier at a time, according to Batty.

I have argued elsewhere that auditory consciousness does involve experiencing objects and features and that we can hear multiple objects at a time (O'Callaghan 2008). Audible features, such as pitch, timbre, location, and duration, appear to belong to sounds or sound sources. And it is possible to hear something loud, high-pitched, and distant while hearing something soft, low-pitched, and nearby. Audition thus solves what Jackson (1977) calls 'the many properties problem,' requiring items to which such attributes audibly appear to belong. Audition, like vision, requires perceptible individuals, or feature-bearers (see also Clark 2000).

Nonetheless, perceptual objects need not be of the same sort across the various sensory modalities. It is plausible to think that visual consciousness reveals three-dimensional, extended individuals that appear to persist by enduring or being fully present at each moment at which they exist, rather than by comprising distinct temporal parts over time. Visual experience thus reveals bodies, including material bodies. And the same is plausible for touch. (I set aside whether objects such as rainbows, holes, and clouds mistakenly appear solid, in the sense that they visually appear to exclude other wholly distinct things from the space they occupy, or merely seem visually extended, in the sense that they appear to occupy space.)

Auditory consciousness in humans, however, does not typically reveal material bodies as such. Most people do not in the first instance hear three-dimensional, spatially extended individuals that appear to occupy space as such. I cannot auditorily make out sharp boundaries or rich internal spatial structure. Echolocating humans, marine mammals, and bats have an advantage in this respect.

Moreover, auditory objects do not usually appear to persist in the same manner as visible or tactual objects. Audition's objects generally do not strike one as persisting by



being wholly present at each moment at which they exist. Instead, subjects hear things as having temporal parts, and the identities of sounds are determined by the features they display over time. The pattern of sounds in time is relevant to being the sound of a spoken utterance, a police siren, an aspen quaking in the breeze, or a melody. What matters in audition is the pattern of features over time. This suggests that auditory objects are event-like individuals. They are happenings or occurrences, rather than typical material objects. This helps to capture the space:time;vision:audition analogy (O'Callaghan 2008).

Olfaction is a curious case. Again, it does not seem that human olfactory consciousness involves experiencing scents to belong to ordinary or material objects, such as roses or candles. The qualities do not seem 'bound up' with such individuals; you do not discern the rose's edges or smell the rose to occupy space; and the scent can outlast the object itself without producing any time lag illusion. Olfactory consciousness does not enable you to differentiate material objects from their surroundings, and the material body itself does not strike you as olfactorily present to consciousness, as it is in vision (in the sense of Valberg 1992).

If anything, olfactory objects are odors, which exist as something like clouds in the air. You can actively explore them and discern their spatial parts and boundaries diachronically. However, at a moment, olfaction on its own does not seem to reveal objects in any familiar sense. One lesson we might extrapolate from Batty's work is that static olfactory individuals lack the defining spatial or temporal structure of visual, tactual, or auditory objects. Momentary olfactory consciousness in isolation lacks the kind of spatio-temporal structure found in vision, touch, and hearing. Static human olfaction is thus a degenerate form of object perception.

Finally, consider taste. Taste on its own is worse off than olfaction. Nonetheless, in multisensory contexts, and over time, tastes appear to qualify food in the mouth. The object or substance you nosh is salty and sweet. Active tasting, with the aid of other senses, such as touch, in fact may involve perceptual consciousness of individuals' bearing gustatory features. Thus, ordinary episodes of gustatory consciousness may have an object-involving structure.

This section has considered four sorts of differences in perceptual consciousness across the senses. One concerns differences in the qualities and attributes revealed by different senses. The other three concern aspects of the structure of experience in the several senses. The first of these is whether and how perceptual consciousness is spatial in different sensory modalities. The second is whether a sense involves objective awareness and thus is fully perceptual. The third is whether a modality reveals objects and features and which perceptual objects each sense reveals.

### 3.4 UNITY AMONG THE SENSES

Perceptual consciousness involves the joint use of several senses. Humans can see, hear, touch, taste, and smell at the same time. The previous section articulated differences in



the qualities and in the structure of perceptual consciousness across sense modalities. This section addresses what unifies perceptual consciousness between senses. In particular, it focuses on the ways in which perceptual consciousness may be multisensory.

### 3.4.1 Unisensory Views

If humans could only use one sense at a time, then perceptual consciousness would be unisensory. Spence and Bayne (2015) defend the view that human perceptual experience at each moment is unisensory, or associated with at most one sense, but that it rapidly switches back and forth from sense to sense with shifts in attention. Against this type of view, it is natural to think not just that multiple sensory systems operate at once, but that perceptual consciousness at a moment can be associated with more than one sense. If the temporal grain of momentary consciousness (the specious present) is coarser than that of some rapid shift in attention from one sense to another, then there is some conscious moment during which one's experience is associated with more than one sense (O'Callaghan 2017).

### 3.4.2 Co-consciousness

Typical subjects enjoy experiences of different senses that are co-consciously unified (Tye 2003; Bayne 2010). That is, they do not constitute wholly separate fields or realms of consciousness. Instead, they belong to a single consciousness, perhaps that of a single subject. Thus, typically, when you have a visual experience while having an auditory experience, those experiences are co-consciously unified into an experience that is both visual and auditory.

Any two conscious experiences at a time may be co-consciously unified. For instance, a sensation, an emotional experience, and even a conscious thought may be subsumed by a single consciousness when each belongs to a single conscious subject. Mere co-consciousness among the senses is nothing special. Accordingly, it could be that one's overall perceptual consciousness at a time is exhausted by that which is associated with each of the respective senses. What I mean is that perceptual consciousness may involve no more than a co-consciously unified collection or fusion of sense-specific parts or attributes.

It is controversial whether experiences involve parts that also are experiences. If experiences are events, it is not clear that a multisensory experience decomposes into sense-specific experiences that also are events. Thus, one might prefer to speak neutrally of features of experiences, which includes parts or attributes. Thus, a co-consciously unified multisensory experience is compatible with the claim that perceptual consciousness at each moment is exhausted by features that are associated with each of the respective sense modalities along with whatever accrues thanks to simple co-consciousness. The latter may include complex features that supervene on those that are sense-specific.

### 3.4.3 Crossmodal Coordination

Crossmodal illusions demonstrate that stimulation to one sense can impact experience that is associated with another sense. Here are three examples. Ventriloquism is an auditory spatial illusion produced by a visible apparent sound source. Video of a speaker articulating /ga/ can make audio of /ba/ sound instead like /da/, due to the McGurk effect. In the sound-induced flash illusion, a disk that flashes once, presented with two quick beeps, looks like it flashes twice.

Crossmodal illusions show that perception conforms to principles that reduce or eliminate conflicts between the senses. For instance, ventriloquism, the McGurk effect, and the sound-induced flash effect involve the resolution of conflicting information about spatial location, phonemes, and number, respectively. In general, resolving intersensory discrepancies helps to deal with noisy and asynchronous sensory signals. It helps to minimize error and improve overall reliability. Sometimes, as with the intersensory discrepancy paradigm in experimental psychology, and at the movies, it leads to illusions.

Performing conflict resolution suggests something more. Conflict requires a common subject matter. This suggests that perceptual systems have a grip on the common sources of sensory stimulation, despite differences in how information about those sources is transmitted and sensorily encoded. But appreciating the identity of an object or feature across senses could not be sense specific. Thus, if appreciating intersensory identity is reflected as such in perceptual consciousness, then not every aspect of exteroceptive sensory perceptual consciousness is associated with one of the senses or accrues thanks to mere co-consciousness. So, not all perceptual experience is modality specific.

Nevertheless, a system could perform conflict resolution without appreciating that it is doing so and without grasping its common sources or subject matter as such. So, it is possible that crossmodal illusions show only that perceptual systems serve to coordinate experiences across distinct senses without reflecting the identity of their shared objects and features as such in perceptual consciousness. If so, then the features of each conscious perceptual episode could be exhausted by those that are associated with each of the respective sense modalities and those that accrue thanks to mere co-consciousness. Therefore, the existence of crossmodal illusions is compatible with the claim that overall perceptual consciousness is a sum of sense-specific experiences.

### 3.4.4 Binding

Awareness of intermodal feature binding is a form of multisensory perceptual consciousness that is not merely a co-conscious fusion of experiences belonging to several senses.

Through awareness of *intramodal* feature binding, it is possible consciously to see an object's being both red and rough, or to have a vertical part and a horizontal part, as in

the letter 'T' (Jackson 1977; Clark 2000; Treisman 2003). In addition, some philosophers maintain that there is *intermodal* feature binding awareness (Bayne 2014; O'Callaghan 2014). Thus, it is possible multisensorily to perceive an object's being both round and rough, or to perceive an explosion's being both loud and bright. Just as seeing something's being red and round may differ from seeing something's being red and something's being round, multisensorily perceiving something's being both loud and bright may differ phenomenologically from hearing something's being loud while seeing something's being bright. Defenders of intermodal binding contend that it is possible multisensorily to perceptually experience a single individual's bearing features perceived using different senses. This difference, however, is not simply a matter of differing apparent spatio-temporal features or extra-perceptual judgments. Skeptics maintain that apparent binding is a matter of inference, judgment, or mere association (Fulkerson 2011; Connolly 2014; Spence and Bayne 2015).

If intermodal binding is reflected in perceptual consciousness, a significant result follows. There is an aspect of perceptual consciousness that unifies multisensory experiences but which does not stem from mere co-consciousness. This is an intermodal variety of what Bayne and Chalmers (2003) call 'objectual unity' that involves multisensory perceptual objects.

If perceptual experiences have contents, intermodal binding awareness involves contents that are not simple conjunctions of contents belonging to separate senses. Perceiving something's being jointly red and rough is not simply seeing something's being red and feeling something's being rough. Instead, it involves attributing features from several senses to a single perceptible item. Such multisensory contents involve items that are shared or identified across the senses, rather than just collections or conjunctions of sense-specific contents.

Nevertheless, someone might contend that, phenomenologically, binding awareness is just an aspect of the structure of perceptual experience and that it does not involve some novel feature or component of perceptual consciousness. After all, binding awareness reveals nothing new in the world. It only reveals the identity of an object that is perceived through multiple senses.

### 3.4.5 Novel Features

Suppose there were features only perceptible multisensorily. For instance, there could be novel feature instances that one could perceive only through the joint use of multiple senses.

Suppose that you could multisensorily perceptually experience intermodal spatial relations; intermodal apparent motion; intermodal temporal features such as simultaneity, order, rhythm, or musical meter; or intermodal causality. In any such case, you could have conscious multisensory awareness as of a new feature instance that you could not otherwise have experienced unisensorily. The coordinated use of several senses would reveal new features in the world.

As illustration, here are two plausible examples. Philosophers have argued that visual consciousness reveals causality (e.g., Siegel 2010; Peacocke 2011). In addition, Nudds (2001) argues that we sometimes perceptually experience something visible to generate or to produce a sound. This is an audiovisual experience of a causal relation that could not otherwise be perceived through separate senses working independently, and it is not a matter of having visual and auditory experiences that are simply co-conscious.

As a second example, consider hearing one musical meter, then feeling another meter tapped on your skin. Now, imagine hearing and feeling the two at the same time. It has been reported that subjects in psychophysics experiments are able to detect and discern a novel audio-tactual meter that is distinct from both the audible and the tactual metrical pattern (Huang et al. 2012). Consciously experiencing such a novel intermodal meter audio-tactually could not be just a matter of having co-conscious auditory and tactual experiences. Instead, it is a novel, emergent variety of audio-tactual consciousness.

Nevertheless, causality and meter each can be experienced unisensorily. In that respect, then, perceiving intermodal instances of causality and meter is not a wholly new sort of perceptual consciousness. However, there could be wholly novel types of features revealed only thanks to the joint operation of several senses. Flavors, for instance, can only be perceived fully thanks to taste and smell working together. That is why being stuffed up with a cold dulls your flavor experiences. No instance of a flavor property is perceptible in the first instance unisensorily because flavors are complex multisensory properties. Experiencing flavors thus involves a novel variety of multisensory phenomenology. Balance, which integrates visual and vestibular information, is another plausible example of a novel multisensory variety of perceptual consciousness.

Any such episode involving multisensory awareness of a novel feature instance or novel feature type is one in which the phenomenal character of an episode of multisensory consciousness is not exhausted by that which is associated with each of the respective sense modalities on that occasion plus whatever accrues thanks to mere co-consciousness. Phenomenal character overflows the several senses.

### 3.4.6 Multisensory Qualities

None of the above establishes that conscious multisensory perception involves novel phenomenal qualities, understood as qualitative properties in virtue of which conscious perceptual episodes may resemble each other in respect of what it is like for a subject to undergo them. Qualia and sensible qualities are examples. For instance, flavor might be a complex, structured multisensory property with only sense-specific qualitative ingredients. So, experiencing flavor might involve no new qualitative phenomenal ingredient. If each qualitative component or ingredient involved in perceptual consciousness is associated with some sense or another on each occasion, then that is an important respect in which perceptual consciousness is sense specific.

It is worth noting that the phenomenal character of a conscious perceptual episode may outstrip such simple qualitative features and those that supervene on them. It could, for example, involve structural properties. So, even if each phenomenal quality were sense specific, that would not entail that phenomenal character is exhausted by that which is associated with each of the respective senses.

Even so, it could be that multisensory consciousness does involve novel qualitative components beyond those associated with the several senses. Consider again a flavor experience. Take the distinctive spiciness of capsaicin. It is not obvious that the distinctive qualitative character associated with the experience of a spicy smoked pepper is exhausted by qualities associated with taste, smell, and somatosensation. Instead, it could involve something further—some new qualitative ingredient that results from taste, smell, and trigeminal somatosensation working in concert. This coordinated activity could reveal a novel qualitative feature that none could reveal independently.

If so, then we have a counterexample even to the claim that each qualitative characteristic revealed in a conscious multisensory perceptual episode is associated with some sense or another, or else is a matter of mere co-consciousness. Not even sensible qualities and not even qualia must be sense specific.

### 3.4.7 Crossmodal Dependence

The previous cases show that overall perceptual consciousness is not exhausted by what is associated with each of the respective senses. Crossmodal illusions show that the character of an experience of one sense can depend causally on concurrent stimulation to another sense. But even experiences associated with one sense that occur in unisensory contexts can depend on other senses. Unisensory consciousness is reshaped over time thanks to multisensory perception.

Perceptual consciousness associated with one sense can depend historically on another sense. Strawson said that auditory awareness of space depends on vision or touch. While Strawson held a purely auditory experience would be non-spatial, he granted that typical audition involves the experience of space. If so, spatial audition is parasitic on vision or touch. Empirical researchers have recently argued that congenital blindness leads to auditory spatial deficits, partially vindicating Strawson. Some aspects of spatial hearing depend on vision. However, lacking vision also can improve spatial hearing in other respects (see Thaler and Goodale 2016).

Moreover, there could be crossmodal forms of amodal completion that shape one's auditory experience of a sound or one's visual experience of an event, even in unisensory contexts. For instance, auditory cortex is active while silently lip-reading, and it affects visual processing in turn. And, plausibly, the auditory experience of someone who has been blind since birth, especially an echolocator, can differ in character from that of someone who has always been able to see. Research on perceptual learning suggests that some such sort of crossmodal dependence is possible. Furthermore, if beliefs and

judgments penetrate perceptual experiences, having an experience of one sense might depend indirectly on forms of experience associated with another.

There could be other forms of crossmodal dependence. An experience of one sense might depend constitutively for its character on experiences of another sense. For instance, visually experiencing material objects as such—as solid bodies that exclude wholly distinct items from the space they occupy—could depend constitutively on touch. De Vignemont (2014) has argued that some forms of bodily awareness depend constitutively on vision. We might say something similar about olfactory awareness of odors as voluminous objects in space. Synesthetic experiences in which audible sounds are attributed colors may provide another sort of example in which the character of an experience belonging to one sense in a unisensory context is parasitic on another.

Any such crossmodal dependence means that there exist experience types that are associated with a given sense on an occasion that would not have been possible under typical conditions if not for another sense. If so, then the features of an experience that are associated with a given sense modality are not limited to those that could be instantiated by experiences belonging to creatures who could only ever consciously perceive using that sense alone.

### 3.4.8 Experiential Modalities

The lesson of this section is that perceptual consciousness is not necessarily a simple co-conscious sum or fusion of experiences associated with the several sense modalities. Consciously perceiving could be more than co-consciously seeing, hearing, touching, tasting, and smelling at the same time.

In what respects, then, does perceptual consciousness correspond to separate sensory modalities? Some may reject that there exist differing modes of experience. Speaks (2015), for instance, opts for a single mode of consciously experiencing rather than several distinct modes of experience corresponding to the several senses (see also Tye 2003).

My own view is that experiences can be typed according to sense modalities, and that they can be typed as such according to their phenomenology (O’Callaghan 2015). But this is subject to two significant qualifications. First, modalities of perceptual experience, understood as types of perceptual episodes, are not mutually exclusive. Being auditory, for instance, does not preclude being visual. An experience may belong to more than one sense. Second, you may not be able to tell of each feature of your perceptual consciousness the sense to which it belongs. While introspection may reveal that you are having a visual experience or a tactual experience (thanks to your awareness of color or of warmth), introspection need not reveal the boundaries between experiences associated with different senses—it may not tell you where vision ends and touch begins. Modality, in my view, is thus not phenomenally basic.

Unisensory approaches, which investigate perceptual experiences of one sense in abstraction or in isolation from the others, therefore face noteworthy methodological

challenges. In multisensory contexts, one sense may causally or constitutively impact experience associated with another. Thus, nothing rules out that some feature of perceptual consciousness that seems to be associated with one sense has as part of its explanation phenomena stemming from another sense. Moreover, no complete account of the character of perceptual experience can be assembled one sense at a time, and it is not possible to draw sharp boundaries between experiences belonging to distinct senses based on phenomenology.

Fruitful topics for future work include whether, how, and in which respects the coordinated use of multiple senses makes possible novel forms of multisensory perceptual consciousness.

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#### Author Query:

AQ1: I have been asked to standardise the titles of the opening and closing sections of each chapter to 'Introduction' and 'Conclusion'. Would you object to this being changed to 'Introduction'?