

Not all perceptual experience is modality specific

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In *Perception and Its Modalities*, eds. Stokes, Matthen, and Biggs (Oxford University Press, 2015), pp. 133–165

1 Minimal multimodality

Humans see, hear, touch, smell, and taste. Episodes of human sensory perceptual experience accordingly are associated with several ways or modes—modalities—of perceiving. Perceptual experiences may be visual, auditory, tactual, olfactory, or gustatory. If there are more or fewer modalities, name them and adjust accordingly.

Individual human subjects commonly see and hear at the same time; or hear and smell; or see, hear, and smell; and so on. Most times while you are awake, your perceptual experience is associated with more than one modality. Perceptual experience is, in this *minimal* respect, *multimodal*.¹

Recent science demonstrates that the senses do not act merely in parallel or in isolation from each other. Different senses interact and influence each other, and this affects perceptual experience.² For instance, cross-modal perceptual illusions occur when stimulation to one sensory system impacts experience associated with another modality in a way that leads to misperception. The ventriloquist effect, for example, is an auditory spatial illusion generated by the visible location of an apparent sound source.

It does not follow that perceptual experience fails to remain *modality specific*. Sensory processes might interact causally while all perceptual experiences nevertheless belong to particular modalities. One sense might causally but not constitutively impact perceptual experience that is associated with another.

¹If it were associated at most with one modality at a time, human perceptual experience at a time instead would be *unimodal*. See Spence and Bayne (this volume). I resist the unimodal experience view for the following reasons. The view is most plausible if (a) consciousness requires attention and if (b) attention is restricted to a single modality at a time. However, (a) is controversial, and it is possible that we do perceptually experience things that are outside the focus of attention. Even so, there are good arguments for rejecting (b) and holding that attention can range over more than one modality at a time. For instance, it is plausible that there can be multimodal objects of attention (see §2.2; see also, e.g., Karns and Knight 2009). Nevertheless, even rejecting all of this, it is plausible that the temporal grain of the experienced present is coarser than that of conscious shifts between modalities, and that there are no temporal gaps between experiences of distinct modalities, which implies that there are times during which experience is at least minimally multimodal.

²See O'Callaghan (2012) for extended discussion.

On phenomenological grounds, it is initially plausible that perceptual experience does remain modality specific. Visual, auditory, tactual, olfactory, and gustatory perceptual experiences have distinctive and recognizable phenomenal character that makes it tough to be fooled about when you are seeing, hearing, feeling, smelling, or tasting. This modality-specific character may seem uninfected by other senses. Visual experience, for instance, does not seem to incorporate auditory phenomenal character. Moreover, nothing stands out in exteroceptive perceptual experience beyond the visual, auditory, tactual, olfactory, and gustatory. Any perceptual experiences that coexist alongside seeing, hearing, feeling, smelling, and tasting generally have escaped philosophical attention. That overall perceptual experience just is the sum of proprietary visual, auditory, tactual, olfactory, and gustatory experiences thus may seem introspectively obvious. In virtue of its phenomenal character, therefore, perceptual experience may seem not more than minimally multimodal.

This paper argues that perceptual experience is not merely minimally multimodal. It clarifies what it means to say that an aspect of perceptual experience is modality specific. And it presents forms of multimodal perceptual experience that undermine the claim that each aspect of perceptual experience is modality specific. It concludes that a multimodal perceptual episode may have phenomenal features beyond those that are associated with the specific modalities.

Some preliminary clarifications are needed.

First, this paper concerns episodes of exteroceptive sensory perceptual experience, rather than interoception, bodily awareness, or any wholly cognitive, intellectual form of perception. I'll just refer to perceptual experiences.

Secondly, a perceptual experience is a conscious episode with, among other attributes, phenomenal character. The phenomenal character of a perceptual experience is what it is like for its subject to undergo that episode. Phenomenal features are aspects of phenomenal character. This paper concerns such phenomenal properties and their instantiations. It is about the respects in which they may be associated with a specific modality.

Thirdly, my topic is not how to individuate or count modalities. Differing accounts specify how to individuate modalities of exteroceptive sensory perception. Such accounts appeal to distal objects; to what is represented; to proximal stimuli; to sense organs; to sensory systems; to phenomenal character; or to several of these.³ Such accounts may be adapted to classify perceptual experiences according to modality. With exceptions I note, my discussion aims to be neutral among available accounts. I assume that some experiences are visual, some are auditory, some are tactual, some are olfactory, and some are gustatory, and that there could be a satisfactory account of what makes an episode of perceptual experience visual, auditory, tactual, olfactory, or gustatory. What distinguishes modalities and what

³See, e.g., Grice (1962); Macpherson (2011b, this volume); Casati et al. (this volume); Matthen (forthcoming).

makes an episode of perceptual experience visual, auditory, tactual, olfactory, or gustatory are questions related closely to this paper's main topic, but they are not its primary target. This paper begins where individuation and classification leave off.

Fourthly, that perceptual experience is multimodal does not imply that a subject enjoys more than one token perceptual experience at a time. Tye (2003, 2007), for instance, denies that a subject's perceptual experience at a time comprises distinct token visual, auditory, tactual, olfactory, and gustatory episodes. Tye maintains that a subject's perceptual experience is a single, unified token event that may be characterized variously, as visual, auditory, tactual, olfactory, or gustatory. Without including multiple experiences, a conscious perceptual episode at a time thus may be both visual and auditory, for example. A single perceptual experience also may have phenomenal character associated with vision, audition, touch, smell, and taste.

The claim that all perceptual experience is modality specific in virtue of its phenomenal character thus can be reformulated to be more neutral, as the claim that all phenomenal character is modality specific. Thus, the thesis that perceptual experience is not more than minimally multimodal becomes the claim that the phenomenal character of any conscious perceptual episode is exhausted by that which is associated with vision, that which is associated with audition, that which is associated with touch, that which is associated with smell, and that which is associated with taste.

Finally, the unity of conscious perceptual experience poses a counterexample even to this revised thesis. Tye (2003, 2007), for example, argues that having an experience that is both visual and auditory—a visual experience co-conscious with an auditory experience—differs from having a visual experience and having an auditory experience at the same time. Thus, the unity among perceptual experiences associated with different modalities is a phenomenal property of multimodal perceptual experiences that is not associated with any specific modality, so not all phenomenal character is modality specific.⁴

If it succeeds, this argument from unity applies among all co-conscious experiences. It affects, for instance, bodily experiences, affective experiences, conscious thoughts, and visual experiences, not just perceptual experiences of different exteroceptive sensory modalities. The general unity of consciousness, however, is not my target. So I shall revise the thesis to reflect it. The thesis that perceptual experience is modality specific and thus not more than minimally multimodal becomes the claim that the phenomenal character of any conscious perceptual episode is exhausted by that which is associated with vision, that which is associated with audition, that which is associated with touch, that which is associated with smell, and that which is associated with taste, along with whatever phenomenal character accrues thanks *merely* to the co-conscious occurrence of visual, auditory, tactual,

⁴See also Bayne (2010), and Macpherson (2011a) for helpful discussion.

olfactory, and gustatory experiences.

2 Distinctiveness

Phenomenal character commonly is *associated with* a modality, such as vision, audition, touch, smell, or taste. There is what it's like to see red, what it's like to hear a squeak, what it's like to feel paste, what it's like to taste Vegemite, and what it's like to smell cinnamon. Some philosophers maintain that perceptual experiences of a given modality have a *distinctive* phenomenal character. Grice (1962, esp. 37, 53), for instance, emphasizes "the special introspectible character of the experiences of seeing and smelling," which differentiates them.⁵ Suppose that phenomenal character is *associated with a given modality* just in case it is distinctive to that modality. If each experience of a given modality has a distinctive phenomenal character, this may enable us to determine readily, by introspecting, whether the phenomenal character of any conscious perceptual episode is exhausted by that which is associated with vision, audition, touch, smell, and taste.

Having distinctive phenomenal character could mean that all and only experiences of a given modality instantiate some common phenomenal feature, such as "the visual character." If so, all and only visual experiences resemble each other in virtue of possessing this unique phenomenal feature. This is one way to interpret Grice's remarks when he speaks of "a generic resemblance signaled by the use of the word 'look,' which differentiates visual from nonvisual sense-experience" (1962, 53).

Distinctiveness, however, does not require a specific, uniform qualitative feature shared by all experiences of a given modality. There might be a family or a class of distinct phenomenal characters whose instantiation is unique to a given modality. Suppose that, for each modality, each experience of that modality has a phenomenal character that no experience not of that modality has. For instance, suppose every visual experience has some phenomenal character that all non-visual experiences lack. For example, many but not all visual experiences instantiate *phenomenal redness*, and no non-visual experience does.⁶ Enough phenomenal character sharing of the right kind among visual experiences may generate Grice's "generic resemblance."

A perceptual experience of a given modality has a distinctive phenomenal character just in case its phenomenal character could not be instantiated by an experience that is not of that modality. If the phenomenal character of each perceptual experience of a given modality is distinctive, then the thesis that all phenomenal

⁵Thus, Grice maintains that perceptual experiences belong to modalities in virtue of their phenomenal character.

⁶I'm taking no stance on the nature of *phenomenal redness*. I especially am not assuming it is an irreducibly qualitative or non-intentional quale. So this should be read as compatible with, for instance, strong intentionalism or naïve realism about phenomenal character.

character is modality specific entails that all phenomenal character is distinctive to some modality. Alternatively, every phenomenal character is associated with a unique modality. This entails that the phenomenal character of each perceptual experience is exhausted by that which is instantiated by an experience of some modality and could not be instantiated by an experience that is not of that modality.

2.1 *Local distinctiveness*

The thesis being considered is that all phenomenal character is modality specific. Thus, all phenomenal character is associated with a specific modality. I am now interpreting the thesis to imply that all phenomenal character is distinctive to some modality—is instantiated uniquely by perceptual experiences of that modality.

Difficulty for the thesis, so interpreted, surfaces if we consider phenomenal character associated with perceptual experiences of sensible features. I understand a feature to be a property or an individual.

Proper sensibles pose no trouble. These are features perceptible only through a single modality. Consider *redness*, for example. It is plausible that each visual experience as of redness has phenomenal character that is not instantiated by any perceptual experience that is not visual. Or consider sounds. It is plausible that each auditory experience as of a sound has phenomenal character that is not instantiated by any perceptual experience that is not auditory.

Common sensibles may pose trouble. These are features perceptible through more than one modality. Consider number, temporal features, or spatial features. Take, for example, *squareness*. You may visually or tactually perceptually experience squareness. (If you find this implausible, take another spatial feature, such as *angularity*.) It is not wholly obvious that the phenomenal character associated with a token visual perceptual experience as of *squareness*, considered as a phenomenal property that is distinct from, but coinstantiated with, the phenomenal character of one's visual perceptual experience as of other features, such as redness, must differ discernibly from the phenomenal character associated with a token tactual perceptual experience as of *squareness*, considered as a phenomenal property distinct from, but coinstantiated with, the phenomenal character associated with one's tactual perceptual experience as of other features, such as texture. Beyond the phenomenal properties that accrue thanks to the perceptual experience of other features, the phenomenal properties that accrue thanks to the perceptual experience of some common sensible need not differ between modalities.

The point is clearer if we suppose, temporarily, that token perceptual experiences are individuated finely. Suppose, for instance, that token experiences are distinct if they represent or involve awareness as of distinct token sensible features. So, if you see something red beside something green, you token an experience of redness that is numerically distinct from your token experience of greenness. If

you see something red and round, you token an experience of redness that is numerically distinct from your token experience of roundness. (You also may have additional token experiences as of both features.) Supposing that experience tokens are so fine grained isolates the phenomenal character associated with experiencing a common sensible from the phenomenal character associated with experiencing other features. Each token visual experience of squareness per se need not differ in phenomenal character from every token tactual experience of squareness per se when the token perceptual experiences are, as it were, stripped of other sensible features.⁷

It is, however, equally plausible that any two token perceptual experiences of squareness per se may differ in phenomenal character when they belong to different modalities, even once we have controlled for differences in phenomenal character that stem from the perceptual experience of other sensible features. Perhaps differing modality-specific modes of presentation generate a phenomenal difference. Or perhaps phenomenal features depend holistically on other sensible features of which one is aware. Or, if perceptual modalities are akin to different intentional attitudes, like belief and desire, perhaps phenomenal character partially is a product of the modality.⁸

2.2 *Intermodal binding*

Another sort of case does undermine the claim that all phenomenal character is instantiated only by perceptual experiences of exactly one modality (again, making an allowance for mere co-consciousness). The case is a variety of multimodal perceptual experience. It involves perceptually experiencing the co-instantiation of attributes perceived through different modalities. For instance, you might perceptually experience something to be both loud and bright, or to be both red and rough. This is the experience of intermodal feature binding.^{9,10}

To perceptually experience as of something loud and something bright differs from perceptually experiencing as of something loud and bright. You might hear a tuba blast while seeing the sun's reflection. But you might instead perceive a

⁷This is especially clear on intentionalist accounts that identify phenomenal features with such properties as perceptually representing squareness.

⁸See, e.g., Chalmers (2004) for discussion of modality-specific modes of presentation and modality-impure accounts of phenomenal character.

⁹Relevant empirical work on intermodal binding includes, e.g., Pourtois et al. (2000); Bushara et al. (2003); Bertelson and de Gelder (2004); Spence and Driver (2004); Spence (2007); Kubovy and Schutz (2010).

¹⁰A note on my use of 'cross-modal' and 'intermodal': In this paper, 'cross-modal' means roughly 'across modalities' in a way that implies directionality, such as in cases where one perceptual modality impacts or influences another. So, for instance, I talk about cross-modal illusions. 'Intermodal' means roughly 'between modalities' in a way that does not imply directionality, as in the experience of intermodal feature binding. 'Intermodal' may refer to features or relations whose perception requires more than one modality.

loud event also to be bright—you might perceptually experience the event that is loud to be that which is bright. Imagine, for example, an electrical transformer bursting ahead of you, perceptibly both flashing and popping. Or imagine a pair of hands clapping closely in front of you. Normally, you'll perceptually experience that event as a single happening with visible and audible attributes. Speech also is a nice example. When visually focused upon a speaker's mouth, you perceptually experience it to be the sound source; you perceptually experience something common as having both visible and audible attributes.¹¹

The phenomenology of intermodal feature binding sometimes breaks down. Imagine watching a poorly dubbed foreign movie or one whose soundtrack is temporally offset from the video. Outside a forgiving range, the experience stops being as of something that bears both visible and audible features, and it collapses into an experience merely as of something audible and something visible. This is disorienting when you anticipate a match. In cases that do not involve speech, the perceptual experience of intermodal feature binding can be more fragile. Whether the feature match is plausible matters more, and attention alone may affect the phenomenology of binding.¹² Certain disorders may impair intermodal integration for particular features. Autism, for instance, hinders combining cues about emotion from different senses.

The perceptual experience of intermodal binding may be illusory. No common event in the movie theater has both the visible and audible features you attribute to the speaking actors. (Likewise for computer demonstrations in the psychology lab.) And ventriloquism is not just an auditory spatial illusion but a carefully coordinated *illusion of identity* between something seen and something heard. A good coincidence can prompt a perceptual experience with the phenomenal character of intermodal feature binding.

So, a perceptual experience as of something's being F and G may differ in phe-

¹¹Cf., Tye (2003, 2007). Tye uses an argument with a similar structure to establish the conclusion that experiences of different modalities are co-consciously unified. But Tye's concern is the difference between having a visual experience and an auditory experience and having an experience that is auditory and visual. Some of Tye's examples involve objectual unity, but he does not draw the contrast I make in the text. This contrast holds between pairs of phenomenally unified audio-visual experiences. It is between a phenomenally unified audio-visual experience of hearing something F and seeing something G and a phenomenally unified audio-visual experience as of something F and G.

¹²See O'Callaghan (2012, esp. §4) for elaboration. Vatakis and Spence (2007), for instance, say:

When presented with two stimuli, one auditory and the other visual, an observer can perceive them either as referring to the same unitary audiovisual event or as referring to two separate unimodal events... There appear to be specific mechanisms in the human perceptual system involved in the binding of spatially and temporally aligned sensory stimuli. At the same time, the perceptual system also appears to exhibit a high degree of selectivity in terms of its ability to separate highly concordant events from events that meet the spatial and temporal coincidence criteria, but which do not necessarily "belong together." (Vatakis and Spence 2007, 744, 754)

nominal character from an otherwise equivalent perceptual experience as of something F and something G, where F and G are features perceptually experienced through different modalities (suppose, for clarity, that each is a proper sensible).

The perceptual experience as of coinstantiation of visible and tactual qualities by a single individual differs in phenomenal character from the mere co-conscious visual experience of color and tactual experience of texture. As I am about to argue, the former could not, however, bear only phenomenal character instantiated uniquely by visual or by tactual experiences. Therefore, the respects in which such contrasting multimodal perceptual experiences differ in phenomenal character cannot each be associated uniquely with a single modality. So, not all phenomenal character is distinctive to a specific modality.

The challenge is to account for the phenomenal character of episodes in which it perceptually appears that something—*the same thing*—bears features experienced with different modalities. Such phenomenologically evident *sameness* might be explained by *shared* phenomenal character. Perhaps two token experiences whose modality differs instantiate the same phenomenal feature, reflecting the impression that, for example, the same item is seen and felt. Or, perhaps, a single token experience of two modalities instantiates a phenomenal character that reflects the impression that a single item has both visible and tactual features.

Alternatively, the phenomenologically evident sameness could be explained by a novel phenomenal character instantiated by a variety of perceptual experience that does not belong to any of the familiar sensory modalities. For instance, one might perceptually experience the sameness or identity of what is seen with what is felt, where this experience is neither visual nor tactual. Instead, the perceptual experience as of the sameness of that which is colored and that which is textured occurs in addition to the visual experience as of something's being colored and the tactual experience as of something's being textured. The relevant phenomenal character then belongs to an extra-visual, extra-tactual, but nonetheless perceptual experience.

Each of these explanations for the phenomenologically apparent sameness evident in the perceptual experience of intermodal feature binding involves an aspect of phenomenal character that is not instantiated uniquely by perceptual experiences of a single modality and that does not accrue thanks merely to co-consciousness. Whether it involves shared phenomenal features or phenomenology of identification, the phenomenal character of a perceptual experience as of intermodal feature binding is not wholly modality specific, under the current interpretation. That is, not all such phenomenal character is instantiated uniquely by perceptual experiences of a given modality.

The argument from the perceptual experience of intermodal feature binding is not the same as the argument from common sensibles. The argument from intermodal feature binding requires that it is possible perceptually to experience visible and audible features to be co-instantiated, and the argument from common

sensibles does not. Furthermore, it is not feasible to escape the argument from intermodal feature binding with help from modality-specific modes of presentation or modality-inflected phenomenal character. Each attempt leaves unaddressed the phenomenal character of perceptually experiencing that a single something has visible and audible features.

The phenomenally apparent sameness evident in a perceptual experience of intermodal binding requires phenomenal character that is instantiated either by perceptual experiences of more than one modality or by a perceptual experience that belongs to no particular modality. Therefore, if the thesis that all phenomenal character of perceptual experience is modality specific implies that all such phenomenal character is distinctive to some modality, the thesis fails. This is one respect in which perceptual experience is more than minimally multimodal.

2.3 *Global distinctiveness*

Not every phenomenal character is such that every perceptual experience that instantiates it belongs to the same modality. This, however, need not undermine the claim that each perceptual experience that belongs to a modality has a distinctive modality-specific phenomenal character. It is plausible, for instance, that the phenomenal character of an episode of visual experience does not wholly match that of any possible auditory experience. In general, taken *overall*, or *globally*, the non-empty perceptual experience that belongs to a given modality during an interval has phenomenal character that could not be instantiated by an experiential episode that is not of that modality. This is because the perceptual experience as of proper sensibles and the perceptual experience of specific arrangements of sensible attributes both contribute distinctive modality-specific phenomenal character to the overall, or global, perceptual experience in a given modality. Even if not all local phenomenal character is distinctive to a modality, all global phenomenal character in a modality plausibly is.

This enables us to preserve the thesis that perceptual experience is modality specific and thus not more than minimally multimodal, which is the claim that the phenomenal character of any perceptual episode is exhausted by that which is associated with each modality, along with that which accrues thanks merely to co-consciousness. Suppose that the phenomenal character of each perceptual experience of a given modality is distinctive in the global but not the local respect. If so, the thesis that all phenomenal character is modality specific now implies just that it is instantiated only by perceptual experiences that belong to a given modality and whose total phenomenal character is not instantiated by any perceptual experience not belonging to that modality. Specific phenomenal features thus could be instantiated by experiences of more than one modality, but the overall phenomenal character associated with each modality, under the current supposition, remains distinctive to that modality. The phenomenal character of any perceptual episode

thereby may be exhausted by that which is distinctive to vision, audition, touch, smell, and taste.

This addresses the perceptual experience of intermodal feature binding. Suppose, for instance, that visual and auditory experiences involved in a multimodal perceptual episode instantiate a common phenomenal feature implicated in perceptually experiencing the very same thing to have both visible and audible features—without some such feature, the identity would not be experientially evident. That phenomenal feature, however, is unique neither to visual nor to auditory experience, so not every phenomenal feature is modality specific if that requires that it is distinctive to some modality. Nevertheless, the visual experience and the auditory experience bear other distinctive phenomenal features thanks to their respective proper sensibles and to the differing patterns of sensible attributes each reveals. Thus, the global phenomenal character of the visual experience could not be instantiated by a non-visual experience, and that of the auditory experience could not be instantiated by a non-auditory experience. The phenomenal character of the visual experience and of the auditory experience is distinctive. It thus may be modality specific. Therefore, if the global phenomenal character associated with a modality is distinctive to experiences of that modality, intermodal binding experience is consistent with the thesis that the phenomenal character of perceptual experience is exhausted by that which is modality specific.

There is, however, an obstacle to asserting the thesis. The obstacle stems from the alternative explanation for the perceptual experience of intermodal feature binding described in §2.2. Suppose that the perceptual experience as of the sameness or identity of what is seen with what is heard, in which visible and audible features are presented as co-instantiated, is neither visual nor auditory. Suppose, instead, that it occurs in addition to the visual and auditory experiences. Such a supra-modal perceptual experience may have phenomenal character that is not associated with vision, audition, or any other familiar sensory modality. If so, even if we grant that visual and auditory phenomenal character are distinctive, not all perceptual experience is modality specific.

We cannot yet rule out this alternative. The trouble is that we are unable introspectively to discern whether the phenomenal character in question is associated with vision and audition or whether it belongs to some further, extra-visual, extra-auditory aspect of perceptual experience. Grant that the overall perceptual experience in a modality at a time has a distinctive phenomenal character—a phenomenal character that could not be instantiated by an experience not of that modality. Attention to distinctive phenomenal character nevertheless may deliver no clear verdict on whether or not some phenomenal feature is instantiated by an experience of a particular modality. Suppose I want to know, of a multimodal perceptual experience, whether or not an aspect of its phenomenal character is associated with a certain modality. Its modality cannot simply be read from a phenomenal feature instance. Unless the phenomenal feature itself is distinctive to that modality, it

does not help to ask whether it is part of a complex phenomenal character that is distinctive. In a rich multimodal perceptual experience, many differing collections of its phenomenal features could be distinctive to a modality, so there may be many candidates for *the* distinctive overall phenomenal character associated with that modality. Some may include the phenomenal feature in question, and some may not. In multimodal contexts, it may be no help to ask which phenomenal features are coinstantiated since, for phenomenal features of perceptual experience, co-consciousness suffices for apparent coinstantiation.

So, alternative accounts disagree about whether the perceptual experience of intermodal feature binding involves only phenomenal character of experiences that belong to specific modalities. Granting that the overall perceptual experience in a given modality at a time has a distinctive phenomenal character does not resolve things. It leaves open whether or not a certain phenomenal feature belongs to the phenomenal character of the overall perceptual experience in that modality, since the overall phenomenal character may be distinctive with or without the phenomenal feature in question. Appealing to the fact that the phenomenal character of any perceptual experience that belongs to a given modality is globally distinctive does not settle which phenomenal features are associated with that modality on an occasion. Therefore, recognizing that perceptual experiences of a given modality have distinctive phenomenal character does not enable us to determine whether all phenomenal character is modality specific. It thus does not enable us to determine whether perceptual experience is more than minimally multimodal.

Talk of the distinctiveness of perceptual experiences of a modality such as vision suggests that in multimodal contexts we are able simply to recognize which determinate complex phenomenal character belongs to experiences of that modality. The presence of distinctive phenomenal features, such as those associated with the perceptual experience of proper sensibles, does mark when, for instance, a visual experience occurs. And it enables us to say of such phenomenal features that they belong to visual experience. This, however, is compatible with numerous ways to delimit the phenomenal character of the visual experience. Attention to globally distinctive phenomenal character cannot by itself determine the boundaries of visual experience. Introspection thus provides no secure way to settle whether all phenomenal character is modality specific.

3 Pure and mere

The thesis being considered is that all phenomenal character is modality specific. The question now is whether the phenomenal character of any perceptual episode is exhausted by that which is instantiated by an experience of one of the modalities. Does each phenomenal feature of a perceptual experience belong to the distinctive phenomenal character associated with some modality? The previous section's lesson is that introspection cannot always settle whether or not a phenomenal feature

is instantiated by a perceptual experience that belongs to a specific modality. We therefore need another way to address the question.

3.1 *Pure experiences of a modality*

The way forward begins with two attractive ideas. The first is that perceptual experiences of different modalities may come apart. If it is possible to have a multimodal perceptual experience that involves visually experiencing and auditorily experiencing, then it should be possible to have a corresponding visual experience without any auditory experience, and it should be possible to have a corresponding auditory experience without any visual experience.

The second is that the notion of a perceptual experience that belongs *purely* to one modality—a purely visual experience or a purely auditory experience, for example—is coherent. Strawson, for instance, famously appealed, in *Individuals* (1959), to a purely auditory experience, and he claimed that it would be non-spatial. By a purely visual experience, for example, I mean a perceptual experience that is visual but not auditory, tactual, olfactory, or gustatory (and so on). Consider, to start, subtracting a human's perceptual modalities one at a time, as through deafness, failing receptors, or brain damage, until only vision remains. But this fails to avoid any tainting by experiences of the other modalities. So we might instead imagine a creature evolved only with human-like vision but no other senses. Or we might take a human born only with functioning vision. Or one subjected only to visual stimulation. For instance, try to conceive of a human visually stimulated but weightlessly immobilized and fed intravenously in a silent, odorless, temperature-controlled "vision room." In each case, perceptual experience presently and historically is exclusively visual, delivering at any time a *purely* visual experience. What matters is that it is possible that a creature could have a purely visual, purely auditory, purely tactual, purely olfactory, or purely gustatory experience. Call these *pure* experiences of a modality.

Now put these ideas together. For any multimodal perceptual experience that involves a given modality, we can talk about a *corresponding* perceptual experience purely of that modality. For instance, for a multimodal perceptual experience that is partly visual, we can talk about a *corresponding purely visual experience*. For any multimodal perceptual experience that involves a given modality, a corresponding pure perceptual experience of that modality is a perceptual experience purely of that modality under equivalent stimulation.

Now stipulate, of each perceptual experience that is visual, that the phenomenal character it instantiates that is *associated with vision* includes only that which a corresponding purely visual experience could have. In a multimodal perceptual experience, for example, the phenomenal character that is associated with vision includes only that which a corresponding purely visual experience could have. This allows that each visual experience has a distinctive phenomenal character associ-

ated with vision, but it does not require that each phenomenal feature associated with vision is distinctive.

Extend the stipulation to the other modalities. In general, for each perceptual experience of a given modality, say that the phenomenal character that is associated with that modality includes only that which a corresponding pure experience of that modality could have.

This provides a way to operationalize what is required *on an occasion* for phenomenal character to be *associated with a given modality* and, thus, what it takes on an occasion for phenomenal character to be *modality specific*. It does not require appealing to introspection, and it does not require appealing directly to an account of how to individuate sense modalities or of how to type experiences by modality. It applies in the first case to phenomenal feature instances, or to phenomenal features on an occasion, rather than to types or to repeatable phenomenal properties. (A distinctive complex global phenomenal character then can be said to be associated with a modality just in case on some occasion it is associated with that modality.)

We now may restate the thesis that all phenomenal character is modality specific. This is the claim that the phenomenal character of any perceptual episode is exhausted by that which is associated with each of its modalities on that occasion, which now implies that it is exhausted by that which, for each of its respective modalities, could be the phenomenal character of a corresponding pure experience of that modality. The phenomenal character of any perceptual episode includes only that which could be the phenomenal character of a corresponding purely visual, purely auditory, purely tactual, purely olfactory, or purely gustatory experience, plus that which accrues thanks to simple co-consciousness. If so, on any occasion, every aspect of phenomenal character is associated with one of the modalities, and in this respect perceptual experience is not more than minimally multimodal. It also follows that there are no aspects of a perceptual experience's phenomenal character that a pure experience of some modality could not instantiate.

3.2 Counterexamples

Some perceptual experiences that belong to a given modality may require prior perceptual experiences of another modality. Thus, for a typical human, even a perceptual experience that belongs to just one modality may have phenomenal character that a corresponding pure experience of that modality could not have. Therefore, it is not the case that the phenomenal character of each perceptual episode is exhausted by that which could be instantiated by a corresponding pure experience of each respective modality. The following two sections develop the counterexamples.

3.2.1 Cross-modal completion

Section 2.2 explained the perceptual experience of intermodal feature binding, in which it perceptually appears that something bears features that are perceived with different modalities. For instance, you might perceptually experience that something is both bright and loud. Good reasons suggest, in addition, that in a unimodal context it is possible with one modality to perceptually experience something as the sort of thing that bears or that could bear features perceptible only through another modality with which it is not presently perceived. For instance, in having an auditory but not visual experience, you might perceptually experience something heard as being the sort of thing that could be seen—as something with visible but unseen features. If so, such a perceptual experience has phenomenal character that no pure experience of any modality could have. The auditory perceptual experience as of something that has or that could have visible but unseen features thus has a phenomenal character that no purely auditory experience does.

So-called *amodal completion* occurs when you perceptually experience something to have perceptible but unperceived features. For instance, you may visually experience a region to continue behind an occluder; you may visually experience an expanse to be the facing surface of a solid object; or you may auditorily experience a tone to persist through a burst of masking noise. Without perceiving the hidden features, you perceptually experience as of something which bears them. This impacts the phenomenal character of perceptual experience. For instance, visually experiencing two bounded regions of space as parts of a single continuous surface differs phenomenologically from visually experiencing those same two bounded regions as disconnected, wholly distinct entities. Auditorily experiencing two tone bursts separated by an interval of time as temporal parts of a single persisting sound differs phenomenologically from auditorily experiencing those same two tone bursts as being discrete, wholly distinct sound events.¹³ The claim is not that you perceptually experience the hidden features. Perceiving an individual does not require perceiving all of its parts or features. Nevertheless, you perceptually experience a thing that has such parts or features, and you perceptually experience it as such. Such completion effects, which shape the phenomenal character of perceptual experience, occur within particular modalities. Perceptually experiencing a surface to continue behind a barrier is a visual effect, and it impacts the phenomenal character of visual experience. So, “amodal completion” is not a perfect label. Such effects are an *intramodal* sort of amodal completion.

It is plausible by analogy that a *cross-modal* sort of amodal completion occurs when through one modality you perceptually experience as of something that has perceptible but unperceived features of another modality, or perceptually experience it to be the sort of thing that has or could have such features. For instance, you may perceptually experience an audible vocalization to have visible but un-

¹³See O’Callaghan (2008) for further discussion.

seen features; you may perceptually experience a visible surface to have tangible but unfelt attributes; or you may olfactorily experience some food to have gustatory but untasted qualities. In each case, a perceptual experience generated by stimulating only one sensory system presents an object as something that bears features of another modality without presenting those hidden features. And this affects the phenomenal character of perceptual experience. Perceptually experiencing a sound to belong to an event that has visible but unseen features differs phenomenologically from auditorily experiencing a pure sound as such, as isolated from any visible source.¹⁴ Perceptually experiencing a visible surface to be impenetrable to touch may differ phenomenologically from visually experiencing it to be holographic and from visually experiencing it in a way that is indifferent about its tangibility. While only a perceptual experience of a single modality occurs (only features perceptible through that modality are perceived), it would be misleading to say that such completion effects involve only a single modality. Since their explanation implicates perceptible features and perceptual expectations of more than one modality, these are *cross-modal* cases of amodal completion.

If cross-modal amodal completion occurs, then there are perceptual experiences that belong to a modality whose phenomenal character no pure experience of that modality could have. For instance, a purely auditory experience could not have the phenomenal character of an auditory perceptual experience as of a sound source with visible but unseen features. A visual perceptual experience as of a solid surface may have phenomenal character that no purely visual experience could have. Thus, perceptual experiences that belong to a given modality may have phenomenal character that is not associated with that modality, according to the current stipulation concerning what it is for phenomenal character of a perceptual experience to be associated with a modality. It follows that there may be perceptual experiences whose phenomenal character is not exhausted by that which is associated with each of the specific modalities to which it belongs. If so, under the current interpretation, not all phenomenal character is modality specific. The phenomenal character of perceptual experience is not exhausted by that which could be instantiated by a pure experience of each of its respective modalities.

There are two potential objections. First, it is reasonable to oppose my characterization of intramodal and cross-modal amodal completion as affecting the phenomenal character of perceptual experience. Some may choose to explain away what I call a phenomenological difference by appealing to expectations or beliefs that do not affect perceptual experience; some may say that the difference in phenomenal character belongs to imagination or to extra-perceptual cognition.

Secondly, it may be possible, after all, to capture the phenomenal character of a perceptual experience of cross-modal completion wholly through phenomenal character that corresponding pure experiences could have. Consider the phenom-

¹⁴Scruton (1997) argues that such *acousmatic experience*, which involves hearing a sound independently from its source, is essential for musical listening.

enal character of perceptually experiencing an audible event to be something that has visible but unseen features. While that perceptual experience has phenomenal character no purely auditory experience has, it may have only phenomenal features that a purely auditory or a purely visual experience could have. For instance, it could be that a perceptual experience of cross-modal completion instantiates phenomenal character associated with hearing a sound *and* with visual amodal completion. The former could be instantiated by a purely auditory experience, and the latter could be instantiated by a purely visual experience. Some thus may contend, against intuition, that each such case of cross-modal completion in fact is both an auditory and a visual experience, rather than just an auditory experience. The perceptual experience, therefore, may instantiate phenomenal character associated with audition and with vision. If every case of cross-modal completion belongs to more than one modality, the thesis may survive under the current interpretation.

3.2.2 Cross-modal parasitism

Strawson (1959) argues in *Individuals* that a purely auditory experience would be non-spatial. Strawson states, however, that ordinary perceivers perceptually experience direction and distance “on the strength of hearing alone,” and he concedes the “full force” of that phrase (1959, 65–6). Hearing spatial features thus does not require making inferences, and it does not require that the correlations between auditory and visual experiences that make auditory spatial perception possible are accessible to cognition as reasons for auditory spatial beliefs. Instead, having non-auditory experiences simply is a necessary condition on hearing spatial features. Suppose, then, that the capacity auditorily to perceptually experience spatial features depends upon the capacity visually or tactually to perceptually experience spatial features. If so, auditory spatial awareness is *cross-modally parasitic* upon visual or tactual spatial awareness.¹⁵

Strawson’s case is not entirely unique. Berkeley (1975) says that perceiving spatial features visually depends upon tactual acquaintance with spatial features. Another type of example is that it may be possible visually to perceptually experience materiality or tangibility. A sculpture or a painting may visibly appear to have certain features, such as being solid or being rough, only thanks to the capacity to feel those features. And it need not just be in respect of saturation or transparency that a brick looks different from a hologram. It also is not entirely implausible that one might visually experience an imbalance in the weight of a tilted column. Or imagine auditorily experiencing a sound as produced by or as generated by an extra-acoustic event. Without the capacity to perceptually experience a seen event to cause a heard sound, it might not be possible auditorily to experience a sound

¹⁵I have argued elsewhere against Strawson’s own strong claim that a purely auditory experience would be wholly non-spatial (O’Callaghan 2010). Nevertheless, it may be that some determinate forms of auditory spatial awareness depend upon vision.

to have such a source. Finally, speech and language present a range of intriguing examples. Consider, for instance, the perceptual experience of spoken or written language. It may be possible, for instance, auditorily to perceptually experience motoric or gestural features, but only thanks to tactual or bodily awareness. It may even be possible visually to perceptually experience properties such as *shouting*, *vocalizing*, or *voice*, but only thanks to previous auditory experiences.¹⁶

Cross-modal parasitism thus occurs when a feature is perceptible through perceptual experiences that belong to one modality (the *parasite*) only thanks to, or in a way that depends upon, perceptual experiences of another modality (the *host*). To borrow Strawson's slogan, the feature becomes perceptible "on the strength of hearing alone"—or, solely on the strength of perceptual experiences that belong to the parasitic modality. The capacity to perceptually experience a feature by way of experiences that belong to one modality is cross-modally parasitic just in case it requires having exercised the capacity to perceptually experience that or some other feature by way of experiences of another modality.

Consider a perceptual experience that requires cross-modal parasitism. A Strawsonian candidate is an auditory perceptual experience as of distance that is not also a visual experience. Suppose that this auditory perceptual experience is cross-modally parasitic upon the visual experience of space. This auditory perceptual experience as of distance differs phenomenologically from any purely auditory experience. It has phenomenal character that no purely auditory experience could have. It thus has phenomenal character that is not associated with audition.

In general, a parasitic perceptual experience as of some feature may differ phenomenologically from any pure perceptual experience of the parasitic modality. It thus may have phenomenal character that, in the current sense, is not associated with that modality. If cross-modal parasitism occurs, therefore, a perceptual experience may have phenomenal character beyond what is associated with each of the respective modalities to which it belongs. So not all phenomenal character is modality specific, according to the current understanding.

Someone might object that these examples of cross-modal parasitism are too controversial to ground a credible argument. Cross-modal parasitism, however, is just a vivid form of cross-modal dependence. Strawson's case and each example above involve a common feature that is perceptible through experiences of one modality only thanks to perceptual experiences of another modality. This draws attention to an underappreciated type of common sensible: those that require perceptual experiences of one modality in order to be perceptually experienced with

¹⁶Alleged cases of cross-modal parasitism are familiar from the phenomenological tradition, which provides a number of curious examples. Merleau-Ponty (1948, 59–63), for instance, says that the perceptible stickiness particular to honey is inextricably bound both to the particular viscous texture and to the particular golden hue of honey. Thus, in visually experiencing honey and its color, one cannot help but experience its stickiness. Perhaps a more plausible example is visually experiencing the honey's viscousness. Merleau-Ponty also quotes Sartre talking about tasting the shape and color of a cake.

another modality. But cross-modal parasitism need not involve a common perceptible feature. It could involve the capacity to perceptually experience some novel feature. Or it could simply involve a new sort of experience. The argument requires only that there are perceptual experiences of one modality that could not occur if not for perceptual experiences of another modality. A variety of reasons could explain the dependence. An indirect example involves cognitive influences upon perceptual experience. Suppose experiences of one modality are required to have certain thoughts. And suppose that such thoughts may alter experience in a second modality in a distinctive way. An experience of the dependent modality thus may differ in phenomenal character from any pure experience of that modality. What matters here is only that some such case of cross-modal dependence is possible. If so, then an ordinary perceptual experience that belongs to a given modality may have phenomenal character that could not be instantiated by a corresponding pure experience of that modality.^{17,18}

3.3 *Mere experiences of a modality*

There is a straightforward repair. The repair depends on an alternative way to understand what it is for phenomenal character to be *associated with* a given modality on an occasion. What it is for phenomenal character of a perceptual experience to be modality specific differs accordingly, as does the thesis that all phenomenal character is modality specific.

If the notion of a perceptual experience that belongs *purely* to one modality is coherent, then so is the notion of a perceptual experience that belongs *merely* to one modality. A *merely visual experience*, for example, is a perceptual experience that is visual but not auditory, tactual, olfactory, or gustatory (and so on). But a merely visual experience does not require that its subject never has had a perceptual experience of another modality; it allows that the subject is entirely normal, with a rich background of auditory, tactual, olfactory, and gustatory perceptual experiences. Suppose a well-traveled, typical human subject is admitted to the “vision room” and stimulated only visually. Or imagine getting a disease that leaves vision intact but eliminates your capacity to experience auditorily, tactually, olfactorily, and gustatorily. We need to be careful in imagining to control for spontaneous sensory activity and for the distinction between experiencing absences and failing to experience. An experience merely of one modality allows prior perceptual experiences of other modalities but requires while it occurs that its subject’s overall perceptual

¹⁷One consequence is that impairments to one modality may, in some respects, impoverish perceptual experiences of another modality. Of course, such impairments may in other ways lead to enriched experiences in another modality.

¹⁸Even if no such cross-modal dependence occurs, the counterexamples of §3.4 still refute the thesis that all phenomenal character is modality specific. If there is no cross-modal dependence, a perceptual experience’s corresponding pure and mere (see §3.3) experiences do not differ in phenomenal character.

experience remains wholly or solely of one modality. Call these *mere* experiences of a modality.

If the examples from §3.2 succeed, then, under equivalent stimulation, the phenomenal character of a pure perceptual experience of some modality commonly differs from the phenomenal character of a mere perceptual experience of that modality. For instance, with equivalent retinal stimulation, the phenomenal character of a purely visual experience may differ from that of a merely visual experience. Having had perceptual episodes of other modalities makes a difference to visual experience.

For any multimodal perceptual experience that involves a given modality, we can talk about a *corresponding* perceptual experience *merely* of that modality. For instance, for a multimodal perceptual experience that is partly auditory, we can talk about a *corresponding merely auditory experience*. For any multimodal perceptual experience that involves a given modality, a corresponding mere perceptual experience of that modality is a perceptual experience merely of that modality under equivalent stimulation.

Now stipulate that, for each perceptual experience of a given modality, the phenomenal character it instantiates that is *associated with that modality* on that occasion includes only that which a corresponding mere experience of that modality could have. For instance, of each multimodal perceptual experience that is partly visual, the phenomenal character it instantiates that is *associated with vision* on the occasion includes only that which a corresponding merely visual experience could have.¹⁹

This delivers a better account of what is required on an occasion for phenomenal character to be associated with a given modality and, thus, of what is required on an occasion for phenomenal character to be modality specific. We now may restate the thesis that all phenomenal character is modality specific, replacing talk of pure experiences of a modality with talk of mere experiences of a modality.

So, the claim that the phenomenal character of any perceptual episode is exhausted by that which is associated with each of its modalities now implies that it is exhausted by that which, for each of its respective modalities, could be the phenomenal character of a corresponding mere experience of that modality. The phenomenal character of any perceptual episode includes only that which could be the phenomenal character of a corresponding merely visual, merely auditory, merely tactual, merely olfactory, or merely gustatory experience, plus that which accrues thanks to simple co-consciousness. If so, there are no aspects of phenomenal character that are not associated with one of the modalities, and perceptual experience is not more than minimally multimodal. It also follows that there are no aspects of a perceptual experience's phenomenal character that a mere experi-

¹⁹To be clear, by "under equivalent stimulation," I mean *overall* stimulation, rather than just to the sense organs of the relevant modality. This is needed to accommodate causal cross-modal influences upon experience of a given modality. The overall *experience*, however, remains unimodal in a mere experience of a modality.

ence of some modality could not instantiate.

Interpreted this way, the thesis accommodates cross-modal completion. A merely auditory experience, unlike a purely auditory experience, could have the phenomenal character of an auditory perceptual experience as of a sound source with visible but unseen features. A merely visual experience, unlike a purely visual experience, could instantiate the phenomenal character of a visual perceptual experience as of a solid surface. The thesis also is compatible with cross-modal parasitism. A merely auditory perceptual experience could have the phenomenal character of an auditory perceptual experience as of distance. Therefore, neither cross-modal completion nor cross-modal parasitism requires ascribing to a perceptual episode that belongs to a given modality phenomenal character that is not associated with that modality—that a corresponding mere experience of that modality could not have. In this respect, phenomenal character remains modality specific.

3.4 Counterexamples

Suppose some perceptible feature instances are accessible only multimodally. If so, it is possible multimodally to perceptually experience some feature instances that you could not perceptually experience through a corresponding mere experience of any modality. Suppose, moreover, that a multimodal perceptual experience of some such feature instance has phenomenal character that could not be instantiated by a corresponding mere experience of any modality. It thus has phenomenal character that is not exhausted by that which is associated with each of its respective modalities. The multimodal perceptual experience of such a novel feature instance would challenge the thesis that all phenomenal character is modality specific.

3.4.1 Intermodal identity

The perceptual experience of intermodal feature binding provides one type of example. It involves perceptually experiencing visible and audible features (for instance) to be coinstantiated. In such cases, something common perceptually appears to bear both visible and audible features. But neither a corresponding merely visual experience nor a corresponding merely auditory perceptual experience could have the phenomenal character instantiated by a multimodal perceptual experience as of the *identity* of what is seen with what is heard. The phenomenal character of such a perceptual experience, therefore, is not exhausted by that which is associated with vision and that which is associated with audition. It is more than minimally multimodal.

Someone might object that an audible and visible individual may be auditorily and visually experienced in a manner that makes a further perceptual act of identification unnecessary. For instance, in a case of intermodal feature binding, suppose that rather than or in addition to distinct token auditory and visual experiences, each of which attributes features to an apparent individual, there is a single token

multimodal perceptual experience as of an individual that bears both visible and audible features. That token multimodal perceptual experience, in which an individual is ascribed both visible and audible attributes, is an auditory and visual experience. Thus, it has phenomenal character associated with audition and phenomenal character associated with vision. This phenomenal character may overlap. That is, a single phenomenal feature instance may be associated on an occasion both with vision and with audition. Thus, no further identification is needed. Someone therefore might contend that the phenomenal character associated with audition, the phenomenal character associated with vision, and that which accrues thanks to mere co-consciousness suffices to capture the phenomenal character of a multimodal perceptual experience as of the relevant identity.²⁰

My reply is that no collection of merely auditory and merely visual perceptual experiences captures the phenomenal character of a perceptual experience as of the identity of something audible with something visible. No two merely auditory experiences distinguish a case in which something is heard and possibly seen from a case in which something is heard and also seen. Likewise for merely visual experiences. And mere co-consciousness alone does not suffice to capture the difference. Thus, a perceptual experience whose phenomenal character is exhausted by that which could be instantiated by corresponding merely visual and merely auditory experiences must fail to distinguish auditorily experiencing something (which might be seen) and visually experiencing something (which might be heard) from auditorily and visually experiencing as of the same thing. So, according to the current understanding, not all phenomenal character is modality specific.

Nevertheless, it helps to have additional counterexamples.

3.4.2 Intermodal relations

If it is possible to perceptually experience a relation that holds between items perceptually experienced through different modalities, then we have a case of a novel feature instance accessible only thanks to multimodal perceptual experiences.

Perceptible spatial relations provide examples. Consider, for instance, perceptually experiencing a sound to be in the same location as a visible source, or perceptually experiencing your visible hand to encircle the felt surface of a cold drinking glass. Simple perceptible temporal relations also provide examples. For instance, consider the contrast between perceptually experiencing a visible event to occur just a moment prior to an audible sound and perceptually experiencing a gap of a few seconds.

These cases, however, may just involve perceptually experiencing spatial or temporal locations through different modalities, along with simple co-consciousness,

²⁰The phenomenal character associated with audition and with vision on such an occasion thus should be distinguished from that of wholly distinct token auditory and visual perceptual experiences, which, even if co-conscious, involve distinct phenomenal feature instances. Further recognition of the identity thus is required.

rather than genuinely perceptually experiencing intermodal spatial or temporal relations.

Further cases that involve temporal features are more compelling. Consider first a case of intermodal synchrony.²¹ Imagine seeing a drumstick strike a snare drum at the precise moment you hear its sound, or seeing a performer jump just as you hear a cymbal. It is plausible that you perceptually experience the events as occurring at the same time. But take the stronger example of intermodal rhythm perception.²² Consider, for example, perceptually experiencing an audio-visual rhythm pattern, such as that which holds between a flashing light and a banging sound. Try the following with a partner. Look at your partner's right hand while she uses it to "air drum" the rhythm *tap-tap [pause], tap-tap [pause], . . .*. Next, close your eyes while your partner taps on a table the simple beat *[pause] [pause] tap, [pause] [pause] tap, . . .*. Finally, open your eyes and have your partner combine these two steps. So, she air drums a couple of taps while holding her left hand out of your view and using it to drum a *tap* just when her right hand pauses. It is possible perceptually to attend to the rhythm of the visible hand movement and the audible drumming.²³ It also is possible to attend just to the visible rhythm or just to the audible rhythm. Perceptually experiencing the intermodal rhythm

²¹Intermodal synchrony perception is the subject of a rich empirical literature. Müller et al. (2008) report, "A great amount of recent research on multisensory integration deals with the experience of perceiving synchrony of events between different sensory modalities although the signals frequently arrive at different times" (309). Fujisaki et al. (2004) say:

To perceive the auditory and visual aspects of a physical event as occurring simultaneously, the brain must adjust for differences between the two modalities in both physical transmission time and sensory processing time. . . . Our findings suggest that the brain attempts to adjust subjective simultaneity across different modalities by detecting and reducing the time lags between inputs that likely arise from the same physical events. (Fujisaki et al. 2004, 773)

Spence and Squire (2003) suggest that a "moveable window" for multisensory integration and a "temporal ventriloquism" effect help explain perceptually apparent synchrony. Stone et al. (2001) found that the optimal audio-visual *Point of Subjective Simultaneity* generally requires a visual stimulus to precede an auditory stimulus, on average (across subjects) by about 50 msec. See also, e.g., Morein-Zamir et al. (2003); Zampini et al. (2005); Arrighi et al. (2006).

²²The fascinating results of Huang et al. (2012) establish intermodal meter perception between audition and touch.

We next show in the bimodal experiments that auditory and tactile cues are integrated to produce coherent meter percepts. . . . We believe that these results are the first demonstration of cross-modal sensory grouping between any two senses. (Huang et al. 2012, 1, abstract)

(For simplicity, I do not here distinguish rhythm from meter—feel free to substitute meter for rhythm in the text.) See also Guttman et al. (2005), which, in a discussion of "hearing visual rhythms" (compare the arguments of §3.2) notes in an aside, "Interestingly, several observers reported experiencing a complex rhythmic gestalt that combined the auditory and visual inputs. However, information from the two senses remained clearly distinguishable" (234, fn. 3).

²³If you are worried that the visible hand prompts auditory imagery, substitute a tactual tap on your arm for your partner's visible air drumming.

differs phenomenologically from perceptually experiencing either of the unimodal rhythms in isolation and from perceptually experiencing two simultaneous but distinct rhythms.²⁴

If human subjects are able multimodally to perceptually experience features such as audio-visual rhythm, then we have a counterexample to the thesis that on any occasion all phenomenal character is modality specific. Consider a multimodal perceptual experience as of an audio-visual intermodal rhythm. On such an occasion, the phenomenal character that is associated with vision includes only that which a corresponding merely visual experience could have, and the phenomenal character that is associated with audition includes only that which a corresponding merely auditory experience could have. Neither the corresponding merely auditory experience nor the corresponding merely visual experience could have the phenomenal character of perceptually experiencing the specific audio-visual rhythm pattern. And simple co-conscious unity does not have or guarantee the phenomenal character of perceptually experiencing a rhythm. So, the multimodal perceptual experience has phenomenal character that is not associated either with vision or with audition on that occasion. We thus have a perceptual episode whose phenomenal character is not exhausted by that which is associated with vision, that which associated with audition, that which is associated with touch, that which is associated with smell, and that which is associated with taste, along with simple co-consciousness.

One type of objection is that if you perceptually experience only events in time but not temporal properties and relations, then this example fails. While I have

²⁴A similar argument may be grounded in a case of intermodal motion perception, such as when you hear something moving towards you and then pick it up visually and continue to track its motion. A more compelling case would involve a novel determinate motion pattern that differed from both the audible and visible motion patterns. For instance, a zig-zag pattern of alternately audible and visible movements; or, merely apparent intermodal motion. On visuo-tactile apparent motion, see Harrar et al. (2008), who say, "These experiments have confirmed that multimodal motion between lights and touches can occur" (816). Compare Huddleston et al. (2008), who say of the audio-visual case, "Although subjects were able to track a trajectory using cues from both modalities, no one spontaneously perceived 'multimodal [apparent] motion' across both visual and auditory cues" (1207) and "The results of Experiment 3 provide initial evidence that, although subjects could use information from both modalities to determine the trajectory of the stimulus, the stimulus used in this experiment was not sufficient to overcome the need for spatial and temporal congruence to integrate multimodal cues for the perception of motion across modalities and, therefore, did not lead to the perception of a unified 'audiovisual' stimulus" (1215). However, despite the latter authors' report of subjects' subjective impressions, their results demonstrate some facility with tracking audiovisual intermodal motion and suggest that lower "accuracy" in the multimodal condition stems from good cues that tell against identifying the auditory and visual stimuli over time as a common item moving through space. In their multimodal condition, subjects correctly determined the intermodal direction of motion at 90% when each stimulus was presented for at least 175 msec (vision reaches this accuracy at 100 msec) (1214, Figure 6). Notably, this was better than in their audition-only condition (vertical display) using one type of sound, which never reached above 80% (Figure 6). Tellingly, subjects achieved the same accuracy in the multimodal condition as for an auditory-only stimulus in the horizontal plane that used qualitatively *different* sounds (1211, Figure 4).

little sympathy for this objection, it helps to have other examples of intermodal relation perception.

The perceptual experience of intermodal causality provides one such example. According to a moderately liberal account, humans perceptually experience causal relations. Intermodal cases provide some good examples.²⁵ For instance, imagine hearing an audible sound a moment after seeing a visible flash. You may perceptually experience the visible event to cause or to produce the audible sound. Likewise, an audible sound may perceptibly appear to cause a visible flash. On an occasion of perceptually experiencing an audio-visual intermodal causal relation, the phenomenal character that is associated with vision is that which a corresponding merely visual experience could instantiate. The phenomenal character of the multimodal perceptual experience that is associated with vision thus does not include that of a perceptual experience of causation. The same holds for audition. The phenomenal character of a perceptual experience as of intermodal causality therefore is not exhausted by that which is associated with each of its respective modalities plus simple co-consciousness.

Each case above involves a multimodal perceptual experience of a relational feature that holds between things perceptually experienced through different modalities. The most plausible reasons to deny that such cases occur also support denying that it is possible to perceptually experience relational features—spatial, temporal, or causal—that hold among things perceptually experienced through a single modality, such as those that hold among parts of a visual scene, among sounds presented over time, or among parts of a thing in contact with different fingers. According to a moderately liberal account of perceptual experience in general, therefore, there is no compelling reason to deny that some such intermodal cases occur.

The phenomenal character of such a multimodal perceptual experience is not exhausted by that which is associated with each of its modalities along with simple co-conscious unity. Each case involves the instantiation by a multimodal perceptual experience of additional phenomenal features. For example, an audio-visual multimodal experience may have phenomenal features associated neither with vision nor with audition, since they could not be instantiated by a corresponding merely auditory or merely visual experience. According to the current understanding of what it is for phenomenal character of a perceptual experience to be modality specific, it follows that not all phenomenal character on every occasion is modality specific. Here is another way to put the lesson. It is tempting to hold that the phenomenal character of any perceptual episode is equivalent to that of corresponding mere perceptual experiences of each modality along with that which accrues thanks to simple co-conscious unity. To accept this is mistaken.

²⁵See, e.g., Siegel (2009), on the visual perceptual experience of causation. See, e.g., Nudds (2001) on perceptually experiencing audio-visual causation. See also, e.g., Sekuler et al. (1997); Guski and Troje (2003); Choi and Scholl (2006).

3.4.3 Flavor

Another type of case deserves attention.

Each example above involves a perceptible relation whose relata are perceived with different modalities. The perceptual experience of the relation instance is multimodal. The phenomenal character of such a multimodal perceptual experience is not exhausted by that which is associated with each of its modalities. It involves phenomenal features that are not, in the sense of §3.3, associated with any particular modality—features a mere perceptual experience could not, under equivalent stimulation, instantiate.

Each relation, however, also may have instances whose relata are perceptible with a single modality. The perceptual experience of the relation instance thus may belong to a single modality. For example, it is possible visually to perceptually experience causality and auditorily to perceptually experience rhythm. A mere visual experience therefore could have the phenomenal character of a visual perceptual experience of causality, and a mere auditory experience could have the phenomenal character of an auditory perceptual experience of rhythm. The phenomenal character of a perceptual experience of causation or rhythm thus may be exhausted by that which is associated with vision or with audition.

Accordingly, the phenomenal character of a multimodal perceptual experience of such a relation need not be entirely novel. It need not, for instance, involve perceptually experiencing a wholly unfamiliar type of feature. Thus, there is room to hold that every phenomenal feature instantiated by a human perceptual experience is, in some perceptual experience, associated with some specific modality. That is, no perceptual experience has phenomenal features of a type that could not be instantiated *under some conditions* by a mere experience of some modality. Therefore, it may be that the phenomenal features of multimodal perceptual experiences are exhausted by those which, in some circumstance or other, could be instantiated by a mere perceptual experience of some modality. This provides a dramatically weaker alternative way to understand the thesis that all phenomenal character is modality specific.²⁶

But consider a type of feature whose instances are perceptible only multimodally. This might provide an example of a multimodal perceptual experience with phenomenal features possessed by no mere perceptual experience of any modality.

Flavor sometimes is cited as an example of such a feature.²⁷ To perceptually experience flavor requires stimulating both taste buds and smell receptors. That is

²⁶This, of course, raises the opportunity to discuss whether the instantiation of such phenomenal features by a multimodal experience depends on their instantiation by an experience that belongs to a modality. This would enable us to consider the stronger claim that all phenomenal character originates in an experience of some specific modality, which implies the weaker claim. I won't take up the question here.

²⁷See, e.g., Smith (2007, 2011); Spence et al. (this volume); cf., Macpherson (2011a). My own understanding of flavor owes a great deal to Smith's work on tasting and flavor and to conversations with him about these topics.

why food seems bland when you're stuffed up with a cold. The tongue and taste system suffices to perceptually experience the basic tastes of salty, sweet, bitter, sour, and umami, but retronasal olfaction is required to perceptually experience flavors, such as that of butter, fried chicken, pineapple, or cardamom. Odors sensed after traveling up through passages at the back of your mouth (retropharynx) are "referred" to the mouth and contribute to apparent flavor.

Flavors are apparent perceptible features attributed to stuff in the mouth, such as a volume of fruit juice or a piece of fried chicken. Flavors are complex features. Tastes are one aspect of flavor. For instance, both sweetness and sourness are aspects of the flavor of pineapple. But tastes do not exhaust flavor. Olfactory attributes also are aspects of flavor. For instance, an important part of the distinctive flavor attributed to chocolate in the mouth is a quality that can be perceptually experienced through smell.²⁸ Somatosensory attributes also are a crucial aspect of flavors. Capsaicin gives chilis their pungent flavor by activating nociceptors; nicotine is bitter at low concentrations but burns at increasing concentrations; tannins give pomegranates and pecans their astringent flavor; even salt is an irritant at high concentrations.²⁹ Flavor involves the coinstantiation of such gustatory, olfactory, and somatosensory features.³⁰ To perceptually experience a flavor therefore may require a multimodal perceptual experience. Thus, no mere perceptual experience of any modality itself is a flavor experience. Flavor is a novel feature accessible only through multimodal perceptual experiences.

This does not yet show that any perceptual experience of flavor has phenomenal features that could not be instantiated by a mere experience of some modality. That claim requires the further assumption that apparent flavor is not identical with a conjunction of features each of which may be perceptually experienced through an individual modality. That is, there is more to apparent flavor than taste, smell, and touch. If so, tastes, smells, and tactual features are parts of complex flavors, but sense-specific features fail to exhaust flavor. In that case, perceptually experiencing a flavor may differ from perceptually experiencing the mere coinstantiation, even by a common sensible individual, of sensible attributes of taste, smell, and touch. It instead may involve perceptually experiencing the instantiation of a complex but unified flavor property, generally by a sensible individual that appears to be located in the mouth. This property has sense-specific attributes among its components, but the apparent flavor is not identical with the simple apparent coinstantiation of sense-specific aspects. It must involve something else, such as a particular structure or pattern of coinstantiation, or an "organic unity" among the sense-specific aspects. Perhaps flavor is like a multimodal gestalt.

If so, not only are some flavors perceptible only multimodally, but the multimodal perceptual experience of flavors provides an example of novel phenomenal

²⁸See Small et al. (2005).

²⁹See Simon et al. (2008).

³⁰The coinstantiation is perhaps only ever merely apparent.

features that could not be instantiated by any mere experience of any modality. No combination of phenomenal character that could be instantiated by mere perceptual experiences of different modalities captures what it is like to taste fried chicken. Thus, even the weakened thesis that all phenomenal character is modality specific fails.

This sketches how flavor perception might involve wholly novel phenomenal character that emerges only in multimodal perceptual experiences. If accurate, it refutes even a very weak interpretation of the thesis that all phenomenal character is modality specific, according to which each phenomenal feature instantiated by a perceptual experience is of a specific type that could be instantiated by a mere experience of some modality. At least three objections must be answered.

The first objection is that flavor perception is a distinct modality of exteroceptive sensory perception, in addition to sight, hearing, touch, taste, and smell. The claim is that, while it shares organs and proximal stimuli with taste, smell, and touch, flavor perception is a distinct perceptual system. This system is supposed to ground perceptual episodes in which human subjects perceptually experience a novel range of flavors, which are sensible attributes distinct from tastes, smells, and tactual features. If so, the perceptual experience of flavor is compatible with an even stronger version of the claim that all phenomenal character is modality specific. Each perceptual experience of flavor may have only phenomenal character that could be instantiated by a corresponding mere perceptual experience of the flavor modality. Thus, the phenomenal character of a flavor experience is exhausted by that which is associated with each of its specific modalities.

This objection is unconvincing. First, each familiar exteroceptive sensory modality has a dedicated organ that transduces physical stimulation from the environment.³¹ Flavor perception lacks a dedicated organ. Moreover, apparent flavors do seem constitutively to involve gustatory, olfactory, and somatosensory attributes. The apparent flavor of dark chocolate, for example, requires bitterness and certain olfactory qualities. Thus, you could not perceptually experience as of the flavor of dark chocolate without bitterness and certain olfactory qualities being perceptually accessible as among its components. A mere perceptual experience of the flavor modality therefore could not instantiate the phenomenal character of a perceptual experience of the flavor of dark chocolate.

The second objection is that the perceptual experience of flavor belongs to taste.³² Flavor experience perhaps requires a healthy olfactory system and past olfactory experiences, without which you could perceptually experience only simple tastes, such as bitterness, but no flavors. A purely gustatory experience thus could not be a flavor experience. We may even grant that episodes of flavor experience commonly are multimodal perceptual experiences involving both taste and smell. Even so, it may be that each flavor experience is an episode of tasting, while not every flavor

³¹Keeley (2002).

³²See Macpherson (2011a).

experience is an episode of smelling. If so, the phenomenal character of a flavor experience could be instantiated by a corresponding merely gustatory experience. Its phenomenal character thus may be exhausted by that which is associated with each of its specific modalities.

This objection has force, but we should resist it. Suppose, with the evidence, that stimulating the tongue's taste receptors does not suffice for flavor experience and that flavor experience requires concurrent olfactory stimulation. But such olfactory stimulation also suffices for olfactory experience, so unless flavor perception blocks olfactory experience, it follows that there could be no merely gustatory perceptual experience as of flavor.

Moreover, apparent olfactory qualities plausibly do form a constitutive part and not merely a dissociable concomitant of flavor. This is especially clear in cases such as the flavor of coffee or of a spice such as cardamom. But the point is obscured by the fact that olfactory components of flavors are not perceptually experienced as being in the usual place—as taken in through the nose from the environment outside the nose—that we associate with the familiar class of olfactory objects and qualities that includes the odors and scents. Instead, the olfactory qualities that belong to flavors commonly are referred or localized to the mouth when they are smelled retronasally and when there is food in the mouth.³³ This is not an illusion or a mistake.³⁴ It is part of the normal, adaptive olfactory perceptual experience of food in the mouth, and it provides useful information about, for instance, whether or not to swallow. More to the point, it is a kind of smelling, facilitated by chewing and swallowing, that is part of what it is to perceptually experience flavors.³⁵ That such experiences are olfactory is supported by the fact that olfactory components to flavors can be smelled through retronasal olfaction in the absence of food in the mouth. A flavor experience *is* in part an olfactory experience of food in the mouth. This variety of olfaction differs in important respects from the more discussed sort of olfaction whose objects are in the outside environment. It nevertheless is a variety of olfaction—whose objects commonly are in the mouth. Such olfaction is critical to the perceptual experience of flavors in this way: the olfactory qualities it reveals are constitutive features of flavors. The perceptual experience of flavor, therefore, does not belong wholly to taste.

The issue turns on the third objection. Allow that flavor is a complex perceptible feature with qualitative components or aspects drawn from taste, smell, and touch (to simplify). Thus, to perceptually experience flavor requires a multimodal perceptual experience. No mere perceptual experience of any modality has the phenomenal character of a flavor experience. Nonetheless, it may be objected that no flavor experience has phenomenal features beyond those associated with each of its respective modalities. If apparent flavor just is a bunch of gustatory, olfactory,

³³See, e.g., Small et al. (2005).

³⁴Cf., Smith (2011).

³⁵Cf., Macpherson (2011a, 460–1).

and tactual qualities, attributed to something in the mouth, then flavor experience instantiates no wholly novel phenomenal feature. The phenomenal character of a multimodal perceptual experience of flavor in fact may have phenomenal character exhausted by that which is associated with each of its respective modalities. The objection challenges the thought that apparent flavor involves either an organic unity or an additional qualitative component beyond its modality-specific features.

My judgment is that we should not rule out that flavor involves structured rather than merely compresent features of the several modalities. One reason is that it seems possible in principle to perceptually experience olfactory qualities, somatosensory features, or basic tastes alongside but as distinct from flavors. Another is that it seems possible that some human could perceptually experience specific olfactory, somatosensory, and taste qualities as coinstantiated but not as constituents of a unified flavor property. The arrangement of constituent features, especially in time, seems to matter for flavor. Nevertheless, defending the claim that flavor is structured raises questions that are well beyond this paper's scope and that I cannot anyway hope to resolve here. So I'll point to the crux and leave unresolved the question whether a multimodal perceptual experience may bear phenomenal features not instantiated by *any* mere perceptual experience of any modality.

For all I have said, therefore, it could be that no perceptual experience instantiates phenomenal features that are not also instantiated by some merely visual, merely auditory, merely tactual, merely olfactory, or merely gustatory experience. I want to emphasize that this much weaker claim does not imply that the phenomenal character of any perceptual episode is exhausted by that which could be instantiated by a corresponding merely visual, merely auditory, merely tactual, merely olfactory, or merely gustatory experience. It thus does not establish that all phenomenal character is modality specific.

4 Conclusion

This paper argues against the idea that all perceptual experience is modality specific. In particular, it argues against the thesis that all phenomenal character is modality specific (even making an allowance for co-conscious unity). And it supports the claim that the phenomenal character of perceptual experience is more than minimally multimodal.

Section 2 argued that not every phenomenal feature is distinctive to some particular modality. That is, not every phenomenal feature is instantiated by a perceptual experience of a given modality and could be instantiated only by experiences of that modality. Thus, in that respect, not every determinate phenomenal feature type is associated with exactly one specific modality. The overall phenomenal character of a perceptual experience that belongs to a given modality nevertheless may

be distinctive, since it is plausible that it is instantiated only by experiences of that modality. Such complex phenomenal character types thus are associated with a specific modality. But, among the determinate phenomenal features that are not themselves distinctive to a modality, introspecting a perceptual episode cannot settle decisively which such features belong to the complex phenomenal character associated with a given modality on an occasion. So, of a rich, multimodal perceptual episode, introspection cannot settle which token determinate phenomenal features are instantiated by an experience of a given modality and which are not. Even granting that the phenomenal character of any perceptual experience belonging to a given modality is distinctive to perceptual experiences of that modality does not enable us to determine introspectively whether or not on each occasion all phenomenal character is associated with some specific modality. Another methodology is required.

Section 3 argued that the phenomenal character of a perceptual experience is not always exhausted by that which is associated with each of the respective modalities. Suppose we assume that for a phenomenal feature to be associated with a given modality on an occasion requires that it could be instantiated by a perceptual experience purely of that modality under equivalent stimulation. This focuses attention on the phenomenal features that could be instantiated by experiences of a single, wholly isolated modality. However, under this supposition, cases of cross-modal completion and cross-modal dependence show that there are perceptual episodes whose phenomenal character is not exhausted by that which is associated with a specific modality on that occasion. Suppose instead we assume, more reasonably, that for a phenomenal feature to be associated with a given modality on an occasion requires only that it could be instantiated by a perceptual experience merely of that modality under equivalent stimulation. This allows for the richer experiences made possible by having a history of experience with more than one exteroceptive sensory modality. Nonetheless, under this assumption, perceptible intermodal identity and other relations show that there are multimodal perceptual episodes whose phenomenal character is not exhausted by that which is associated with a specific modality on that occasion. In addition, the case of flavor may show that there are novel phenomenal features that could not be instantiated by any mere experience of a given modality. Section 3 thus establishes that it is not the case that the phenomenal character of each perceptual episode is exhausted by that which on that occasion is associated with vision, that which is associated with audition, that which is associated with touch, that which is associated with smell, and that which is associated with taste, plus that which accrues thanks merely to co-consciousness. Thus, not all phenomenal character is, even in this relatively weak respect, modality specific. Perceptual experience thus is more than minimally multimodal.³⁶

³⁶I am grateful to Dustin Stokes, Stephen Biggs, and Mohan Matthen for their valuable feedback. Thanks also to David Chalmers, Charles Siewert, and Barry C. Smith for helpful exchanges. And

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many thanks to Jeff Speaks for incisive written comments.

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