

XV – Cross-Modal Experiences

FIONA MACPHERSON

This paper provides a categorisation of cross-modal experiences. There are myriad forms. Doing so allows us to think clearly about the nature of different cross-modal experiences and allows us to clearly formulate competing hypotheses about the kind of experiences involved in different cross-modal phenomena.

Philosophers and scientists used to think about and investigate the sensory modalities in isolation, or at least tried to do so in so far as this was possible. The sensory modalities include vision, audition, touch, taste, smell, and many more besides – some in humans and some in other animals.¹ A common assumption was that the sensory modalities were perceptual systems isolated from each other. Each sensory system produced, unaffected by the others, a perceptual experience characteristic of that sensory modality (a ‘uni-modal’ experience) and perhaps other uni-sensory, non-conscious, sub-personal representational informational states characteristic of the modality. For example, visual experiences and tactile experiences are typically different. Their typical phenomenal characters are different and what they represent is typically different: colour, shape and size of objects at a distance from the body in the case of vision; and shape, size, temperature and texture at the surface of the body in the case of touch. Comparable to experiential states, the non-conscious, sub-personal states associated with these modalities would, typically, represent different things about the world. It was thought that subjects of experience could think about, act upon, and otherwise draw upon, the deliverances of the experiences in each modality simultaneously, but that they were drawing upon distinctive sources – different uni-modal experiences. Likewise, their brains could process the outputs from each of the senses simultaneously, but these outputs were themselves thought to be discrete, distinctive and uni-sensory.²

¹ See Macpherson (2011).

² According to modular views of the mind, such as Fodor’s (1983), modules are parts of sensory modalities—such as colour vision, motion perception and facial processing—but, as McCauley and Heinrich (2006) and Robbins (2009) note, if one held such a view it is also plausible to think that the sensory modalities themselves are modular and hence informationally encapsulated.

Now, in the face of recent incontrovertible empirical evidence, the idea that the sensory systems do not interact has been discredited.³ Philosophers and psychologists are beginning to investigate the interactions between the sensory modalities. In doing so, two terms have become ubiquitous: ‘multisensory processing’ and ‘cross-modal experience’. The first is, to my mind, relatively unproblematic. It refers to what happens when information from two sensory organs is combined in some way in the brain. It refers to the interaction of processing originating from different sensory organs. There can be many different forms of such combination and interaction. One is a simple combinatorial form. To illustrate, imagine two brain states—one which represents that P, the other which represents that Q—interacting to producing a third brain state that represents that P and Q. Another form, ‘multisensory integration’, occurs when information from two sensory organs is combined in the brain to yield genuinely new information that differs from the information deriving from each sense organ. Moreover, as the term is used, it refers, in particular, to states in which this new information cannot easily be further manipulated so as to separate out again the information derived from each sensory organ – the more it is so, the more it is integrated.⁴ There may be a variety of different types of multisensory integration which correspond to different sorts of new information or different ways in which new information is produced.⁵

The second is much more problematic. Very roughly, ‘cross-modal experience’ is used to refer to a conscious perceptual experience produced by or associated with more than one sensory modality. However, exactly what is meant by ‘cross-modal experience’ is almost always unclear and underspecified. The phrase is bandied about as a fashionable *façon de parler*, without enough thought given to its exact meaning. People are in danger of talking past one another, of referring to different kinds of phenomena without realising it, and not considering in enough detail the nature of the claim that they are making in designating an experience ‘cross-modal’.⁶

³ See Calvert, et al. (2004) for some of the latest evidence.

⁴ See Stein (forthcoming a).

⁵ The notion of ‘new’ information will be elaborated on below.

⁶ The phrase ‘cross-modal experience’ is used throughout much of the psychological and philosophical literature on synaesthesia and in some of the literature on sensory substitution. In addition, it is used in scientific work on multisensory processes and integration. For just two examples see Wallace and Stein (2007) and Yu et al. (2010).

In this paper, I provide a taxonomy of different sorts of perceptual experiences that one might refer to as ‘cross-modal’. Distinguishing these different sorts of experience is a useful exercise, for then we can begin to consider which kind of experience is occurring in various cases when two or more sensory modalities are in operation or when multisensory integration takes place. Different accounts of known cross-modal illusions and other cross-modal phenomena, such as synaesthesia and sensory substitution, will come to be perspicuous, and then the work of deciding between them can begin. People will be able to use this taxonomy to make clear which kind of cross-modal experience they wish to refer to. Finally, if some people wish to claim that there are no such things as cross-modal experiences, as some are wont to do, then they will be able to identify precisely which type of experience it is that they deny the existence of.

I will begin, in §I, by laying out the assumptions that I will make in this paper and drawing attention to the many philosophical issues that lie behind them. I will make the distinction between tokens and types of sensory modality and note that the issue of how to individuate the senses will impact on the issue of what one thinks a cross-modal experience is. In §II, I outline the nature of uni-modal experiences. In §II, I distinguish between different forms of cross-modal experience. A major distinction will be made between cross-modal_{across} experiences and cross-modal_{within} experiences. Within the latter kind, further subdivisions are made.⁷ In §IV, I briefly consider how we should classify hallucinatory experience and examine whether one can have introspective knowledge of whether an experience is cross-modal.

I

Preliminaries. To get to the issues I wish to discuss in this paper, in this section I mention, without settling, many contentious questions in the philosophy of perception about the nature of experience and the senses that bear on my subsequent discussion. I will also outline some terminological issues. After doing so, in subsequent sections, I discuss the different ways to individuate the

⁷ Readers may wish to consult the tables at the end of this paper summarising these distinctions as they read through this paper.

senses and show how this impacts upon the issue of what a cross-modal experience is.

I assume that experiences are conscious mental states that have phenomenal character and representational content. The phenomenal character of an experience is ‘what it is like’ to have the experience.⁸ There are different notions of what the representational content of experience is. Roughly, what an experience represents is what it is about. This notion can be spelled out in different ways. For example, some people say that what an experience represents is how the world seems to the subject of the experience. More particularly, what a visual experience represents is how the world looks to a subject; what an auditory experience represents is how the world sounds to the subject; and so on for each of the sensory modalities. Others spell it out in terms of the accuracy or correctness conditions of the experience, that is, how the world would have to be if the experience were veridical. And there are other ways.⁹

It will be useful for my purposes to be able to talk of a creature’s physical sensory systems. By ‘sensory systems’ I will mean the sense organ associated with a sensory modality – the eyes in the case of vision, the ears in the case of audition, the skin in the case of touch and so on – together with the relevant parts of the nervous system and brain regions typically associated with each sense. Again we meet with contentious questions that I will simply ignore. For example, what is it for something to be an organ of sense? And what is it for something to be a particular one, such as an eye, or an organ of vision? We also know that, while the brain is divided into regions associated with each sense by scientists, evidence suggests that such mapping is rough and ready, not least from evidence concerning multisensory integration, which shows that areas of the brain thought of as say visual, such as the visual cortex, can be activated and affected by non-visual processes.¹⁰ Again, however, I do not believe that we need to be stymied by these issues to proceed; for all we need to note is that there are areas of the brain paradigmatically associated with each of the senses.

⁸ The phrase was introduced by Nagel (1979).

⁹ See for example the essays in Hawley and Macpherson (2011). Some people deny that experiences have representational content at all. There is a debate about whether or not there is a minimal sense of content that even those who otherwise explicitly deny it must be committed to. I do not engage in that debate in this paper.

¹⁰ See Ghazanfar and Schroeder (2006).

I will use the terms ‘cross-modal’ and ‘uni-modal’ to refer to types of experience. I will use the terms ‘multisensory’, ‘multisensory integration’ and ‘uni-sensory’ to refer to types of brain processing. I am using these terms in this way as this is a fairly common way of using them, however, there are no clear standards in the literature. There is a proliferation of terminology in this field. The terms ‘cross-modal’, ‘multimodal’, ‘multisensory’, ‘intersensory’, ‘heteromodal’, ‘polysensory’, ‘polymodal’ and ‘supramodal’ are all used to describe a variety of phenomena that involve more than one sense. And ‘uni-modal’, ‘modality-specific’ and ‘sensory-specific’ are all used to describe a variety of phenomena that involve only one sense. There is no consensus in the literature about whether these terms apply to all the phenomena that one may wish to describe as related to one or more sense (for example, experiences, brain processing described at a functional level or anatomical level, the nature of individual cells, behavioural tasks, sensory inputs, etc.) and, if they do, whether they mean the same things when they do.¹¹ I will sidestep this confusion by sticking to the usage outlined above.

‘Amodal’ is a related term, but it is almost exclusively used to describe perception. In fact, ‘amodal perception’ has two distinct meanings. The first is the perception of objects, properties or relations that either are or can be perceived by more than one modality, such as size, shape and texture which can be perceived by vision and touch. The second meaning refers to the perception, or apparent perception, of objects, properties or relations that are not perceived through one, or more, senses. The paradigm cases of this are the seeing, or apparent seeing, of a proper part or parts of an object that is occluded, and the seeing, or apparent seeing, of a whole three-dimensional object, including its back side, when, in a strict sense, only the facing surface is perceived.¹² I will set amodal perception aside for the majority of this paper. Cases of it, in either sense of the term, may or may not be cross-modal – which is the topic of investigation of this paper. However, I will return to the topic briefly in §3.2.2.

There can be both types and tokens of sensory modalities.¹³ The types of sensory modality are commonly taken to be vision, hearing, taste,

¹¹ See Calvert (2001) and Stein (forthcoming a).

¹² See Bahrck (2010) who discusses these two uses.

¹³ A type is a general kind of thing and tokens are the particular instances of the type. For example, in the word ‘proclivities’ there are ten types of letters but twelve token

touch and so on. There are individual tokens of such types. My vision constitutes one token of a visual sense, your vision constitutes another, and perhaps there could be creatures with more than one visual sensory modality.¹⁴ It is difficult to know how to identify what makes for one and only one token of a sense and what criteria should be employed to do so. For example, some philosophers and scientists hold that while ordinary people think of their sense of touch as one token sensory modality, it may actually be three, one pressure sense, one temperature sense and one pain sense. Whether they are right to do so is a difficult question. I will assume in this paper, however, that, for the most part, we know when we are considering one token sense and when we are considering many, and that we know how many tokens of a sense a creature has and which are operative in any case. In any given case, this question would have to be settled before one can answer the question of whether an experience is uni-modal or cross-modal. I will also assume that our common-sense views about what one whole sensory modality is are correct. Thus, I will typically take it that vision, touch, audition, proprioception are each one and only one sensory modality. This simplifying assumption will not affect the details of the paper.

The nature of taste and smell presents us with a complicated and interesting case. Some people think that, although taste and smell can exist as separate senses, a lot of the time they combine to form a new sense – a sense of flavour. Others think that it is merely the case that taste experiences are frequently affected by olfactory processing. Given the special complexities of these cases, I will not typically use smell, taste and flavour as examples. However, I will say more about the case of flavour and the two main competing views about it when laying out my taxonomy of cross-modal experiences. How the taxonomy should be applied to these cases will depend on settling prior issues of whether we have one sense or two senses operative.

letters for there are three tokens of the type 't'. Another example of a type is the kind tiger, the tokens of which are the particular animals of the species. Types are sometimes identified with universals but, they are more plausibly identified, I think, with general or abstract objects. As such, they are often taken to be kinds or sets. (I do not take them to be laws, which Peirce, who first introduced the distinction took them to be. The type-token distinction is now used in philosophy in a way that supersedes Peirce's original usage, which depends on his theory of signs.) Further discussion of the nature of the type-token distinction can be found in Wetzell (2011).

¹⁴ Grice (1962) imagined Martians with two sets of eyes one above the other that he speculated might have two senses of vision.

This is an important and difficult task, but it is clearly distinct from the main goal of this paper and thus I will not undertake it. Nonetheless, I will indicate what one should think of the cross-modal nature of taste and flavour experiences if one holds one or other of the competing views.

Matters are further complicated when it comes to determining what type a sense is, once we have identified that we have an instance of just one sense. Philosophers have long debated the question of how to do this – that is how to individuate the senses. They have produced many criteria that have typically been seen as competing accounts of how to do so. The four main criteria are: (1) the nature of the physical sensory systems, (2) the nature of the proximal stimulus that impacts on the sensory organ, (3) what is represented by the experiences associated with each modality, and (4) the nature of the phenomenal character of the experiences associated with each modality.¹⁵ Some people might think that there are other criteria that should be considered. For example, some people wish to count the sensorimotor approach as a distinctive approach, while I would want to subsume it within the representational approach. This doesn't matter. For the purposes of this paper I will simply assume that these are the four criteria. Those interested in other criteria can adapt what follows to their view appropriately – as should become clear shortly.

These criteria can also be used to individuate the modalities of experiences (as well as the senses themselves). For example, one could hold that an experience was visual if it (1) was produced by visual physical sensory systems, or (2) was produced by means of the proximal stimulus being that of vision, e.g., light or electromagnetic radiation, or (3) had the appropriate visual representational content (e.g. the shape, size and colour of objects at a distance from the body), or (4) had visual phenomenal character.¹⁶

¹⁵ See Macpherson (2011) for more details.

¹⁶ The way that I use the proximal stimulus criterion in this paper is to determine the modality of an experience depending on the actual proximal stimulus that caused it. However, it could be used in another way. The modality of an experience could be determined by the nature of the proximal stimulus that typically causes an experience of the type in question (or that is typically employed by the way of perceiving in question). I think that this second way of using the proximal stimulus criterion requires some independent conception of a type of experience (or way of perceiving) that must draw on one of the other criteria – most likely the phenomenal character criterion or the representational criterion – and thus does not use the proximal stimulus criterion in the most powerful and independent way it can be used, which is why I refrain from so doing.

Clearly each of these criteria requires further specification. What makes a sensory system, a proximal stimulus, a phenomenal character or a representational content visual, or of any of the other sensory modalities? That question will demand a great deal of combined philosophical and empirical investigation. I will assume that answers to such questions can be found and I will work with the criteria without specifying their nature further.

These different criteria of what it is for an experience to be in a particular modality can yield different verdicts concerning which modality a particular experience belongs to. For example, if there was an experience that was caused by the proximal stimulus of vision, say light, but had the phenomenal character of a tactile experience then, according to the second criterion, the experience would be visual, according to the fourth, it would be tactile. The most important point for the discussion in this paper is that these criteria are vitally important for the purpose of saying what a cross-modal experience is. This is because which criterion one adopts will affect whether one thinks that an experience is cross-modal or not. To see this imagine an experience that is jointly caused by the proximal stimulus of vision and the proximal stimulus of touch but which has the phenomenal character of audition. The proximal stimulus criterion would suggest that this is a cross-modal experience (a tactile-visual experience), while the phenomenal character criterion would suggest that it is a uni-modal auditory experience. Likewise, if we imagine an experience caused by the proximal stimulus of vision, but that has the phenomenal character of both vision and audition then the proximal stimulus criterion would suggest that this is a uni-modal visual experience whilst the phenomenal character criterion would suggest that it is a cross-modal (audio-visual) experience. (In fact, in the case of the phenomenal character criterion, things will turn out to be more complicated than this, as we will see below.)

I have written at length on the issue of individuating the senses elsewhere, arguing that we should not choose between these criteria for individuating the senses but instead use them all.¹⁷ On this view, a variety of different types of cross-modal experience will be possible – types corresponding to the different combinations of criteria that might make an experience cross-modal. The taxonomy of cross-modal experience that I

¹⁷ See Macpherson (2011).

provide below has the virtue of spelling all of these out. The taxonomy is thus maximally inclusive. This is good, for it allows one to see all the ways in which one might consider an experience to be cross-modal. If, unlike me, you adopt only one of the criteria for individuating the senses then you will think that some of the ways that I say an experience can be cross-modal are more important than others, or that some will be the crucial ones that really make an experience cross-modal. In that case, at least I will have provided you with a vocabulary to identify what you wish to mean by ‘cross-modal’ and with which you can dispute the meaning with others.

Another important point to note is that my discussion of cross-modal cases concerns those that occur when *perceiving* the world. I will consider hallucinatory counterparts of perceptual cases in §IV. As we will come to see, perhaps somewhat surprisingly, it will turn out that not all hallucinatory counterparts of cross-modal experiences will themselves turn out to be cross-modal.

II

Uni-modal Experience. One might wish to use the term ‘cross-modal experience’ as a catch-all term to refer to any of the types of cross-modal experience that I will outline below. There is no harm in this, if this is made clear (which typically it is not). Thus, I will use the term ‘cross-modal_{overarching} experience’ to refer to any experience of the cross-modal kind I identify below.

A good methodology, I believe, in thinking about cross-modal experiences is to first elucidate what is not a cross-modal_{overarching} experience. In other words, to elucidate what is incontrovertibly a uni-modal experience – the purest case of a uni-modal experience that there could be – a ‘uni-modal_{pure} experience’. Once we have a clear idea of such an experience we can begin to consider the ways in which experiences can be different from this and thus the different ways that they can be cross-modal.

2.1. *Uni-modal_{pure} Experience.* A uni-modal_{pure} experience is an experience that is uni-modal according to all four criteria and the modality according to each is the same: it has phenomenal character associated with only one modality, representational content associated with just that modality, and it is caused by

a proximal stimulus and produced by the activation of one sensory system each associated with just that modality. For example, a uni-modal_{pure} visual experience is an experience that has all and only visual phenomenal character and visual representational content. It is caused by light stimulating the eye and no other proximal stimulus and it is caused by only the activation of the visual sensory system.

Although specifying the nature of such an experience seems straightforward, in fact one must be rather careful in specifying what it is for just one sensory system to be activated, and hence the conditions in which a uni-modal_{pure} experience might arise. To see this, consider the following example. Suppose that you simultaneously visually perceive trees and auditorily perceive birdsong, and that you have a common or garden experience that you would naturally describe as being one of simultaneously seeing some trees and hearing some birdsong. Call this experience E_1 . And in order to rule out any possible cross-modal effects from other senses, let us suppose that you only have, and have only had, and all members of your species have only had, visual and auditory sensory modalities. One might think that one can hone in on a uni-modal visual experience by thinking of just that part of E_1 that corresponds to seeing the trees. One might suppose that it is the part that has characteristic visual phenomenal character and characteristic visual representational content. Call the experience that does have that characteristic visual phenomenal character and content experience E_2 .¹⁸ Note that just from the specification of E_2 thus far, we cannot know whether it is a uni-modal_{pure} experience. One reason is that scientists have discovered that what sensory input there is to one sensory organ does not always solely determine what happens in the rest of the sensory system associated with that organ, and, in particular, does not solely determine the nature of the experience associated with that modality – its phenomenal character and representational content. Often the processing that goes on in one sensory system is affected and modified by the processing that goes on in another sensory system and/or by what one experiences in another sensory modality. These are instances of either multisensory processing or multisensory integration. They have also discovered that this happens far more frequently, and in far more surprising

¹⁸ Here I am supposing that parts of experiences that correspond to each of the different sensory modalities are themselves experiences. This view is questioned by Tye (2003), whose view will be considered in more detail below.

ways, than one might have thought before one looked at the evidence. Here are just a few examples.¹⁹

Shams et al (2000) investigated the sound-induced illusory flash experience. When one flash was presented together with two tones, subjects reported that they saw two flashes. Moreover, McCormick and Mamassian (2008) present evidence that suggests that the effect is genuinely perceptual, rather than merely reflecting the judgments of the subjects about what they saw. Sekuler et al. (1997) reported that sound influences the perception of motion of an ambiguous stimulus. When no sound was heard, two objects presented on a computer screen were more likely to be seen as moving towards each other, overlapping, and then moving past each other in the original direction of movement. If a tone was played at the point when the objects were coincident, the objects were somewhat more likely to be perceived as bouncing off one another thereby changing their direction of movement. McGurk and MacDonald (1976) reported that when an auditory stimulus – a /ba/ sound – was heard alone, it was reported accurately as a /ba/ sound. But when it was heard whilst looking at lips making movements that would produce a /ga/ sound, then people report hearing a /da/ sound instead. This phenomenon has come to be known as the ‘McGurk effect’.

Thus, E_2 , the experience as of seeing the trees, is not guaranteed to be a uni-modal_{pure} experience for we have not specified that it is produced by the activation of only one sensory system – the visual sensory system – and that it has only the proximal cause associated with vision, namely, light. E_2 may in fact turn out to be produced by the operation, not only of the visual sensory system, but also of the auditory sensory system.

One might then think that one must also simply specify, in line with the initial definition of a uni-modal_{pure} experience, that E_2 is also caused just by the activation of the visual sensory system and by vision’s proximal cause, if it is to count as uni-modal_{pure}. That is correct, however, again, further elucidation of what exactly that should be taken to mean is required. Consider what happens when just your visual system receives some stimulation from a proximal stimulus (light). To imagine this, recall E_1 . Now further suppose that whilst looking at the trees and listening to the birds, in an instant, you are struck deaf. Consider now what your experience would be like. Call that

¹⁹ The latest summary of the evidence can be found in Stein (forthcoming b).

experience E_3 . Might we now say with assurance that E_3 is a uni-modal_{pure} visual experience?

Again, I think that the answer is no. To see why, consider what happens when one first loses a sense. I will consider the loss of both hearing and sight, as they provide interesting comparison cases.

When one first becomes deaf or blind, what is it like? There are two plausible answers that one might give to this question. The first is that when one loses a particular sense it is like having a particular kind of perceptual experience in that sensory modality. In the case of being instantaneously struck deaf, it is like hearing silence. It is like having an auditory experience that represents that there are no sounds around. (Of course this experience is likely to be inaccurate.) And one might think that if one is struck blind then it is like seeing blackness (or 'brain gray') in the visual field, as one might do when in a deep dark cave where no light penetrates.²⁰ (Again, in the case of being struck blind, such an experience is likely to misrepresent the world.)²¹

If one held this view, then one could think that E_3 might not be a uni-modal_{pure} experience because, although one has just been struck deaf, one's experience is both of seeing trees and of hearing silence. And even if one singled out the part of E_3 that corresponded to just the seeing of the trees – the part of E_3 with just the visual phenomenology and visual representational content – one is not thereby guaranteed to have singled out a uni-modal_{pure} experience. For that part of the experience might be in part caused either by the experience of hearing silence or by various brain states that represented silence. In other words, that part of the experience might not be produced solely by the visual system, as one might have thought.

The second answer to the question of what it is like when one first becomes deaf or blind is that it is like having no auditory or visual experience at all, where this is to be understood as contrasting with having experiences of

²⁰ In fact, when in the total absence of light, one's experience of blackness is tempered by various illusory light patches that seem to appear amidst the black. Perhaps that is what it is like to be struck blind. It matters not for our purposes. What is crucial is that there is *some* visual experience that we would think that we have.

²¹ In fact we know that some people who go blind report that they sporadically undergo a variety of hallucinations from simple phosphene-type experiences to experiences of complex visual scenes, for example, in Charles Bonnet Syndrome. However, these disappear over time. These cases are not relevant to my argument here. What is crucial is just that we understand blindness as involving some visual experience or other.

no sound and experiences of blackness. To have an experience of no sound is to have an experience that represents that there are no sounds around. Such an experience would be false when there is sound around. Having no auditory experience means that you simply represent nothing – neither the presence nor the absence – of sounds in your environment. There is no experience concerning which correctness or incorrectness with respect to sounds arises. In the case of vision, the contrast between an experience of blackness and no visual experience can be appreciated by considering the visual awareness that you typically have of the space behind your head (supposing of course that your eyes are in the position of a normal human and that you are not looking in a mirror or at a video of that space, or similar). You do not visually experience the space behind your head as being cast in darkness. Rather, you simply lack a visual experience of it. To imagine being blind on this view – that is to imagine having no visual experience at all as opposed to an experience of blackness – imagine your present visual field (which in a normal human has an angular extent of almost 180 degrees in the horizontal axis and approximately 100 degrees in the vertical axis) contracting, to be replaced not by blackness but simply by lack of visual awareness. As your field of vision contracts you would begin to have a form of tunnel vision and then your visual field would shrink completely until it no longer exists at all.

If one held this view, then one could think that E_3 was a uni-modal_{pure} experience because there simply is no auditory experience to causally interact with one's visual experience. One would also have to hold that there were no brain states representing sound at all – either its presence or absence – to interfere with the visual sensory processing (or that any such brain states did not causally interact with the visual sensory processing).²² In such a case – a case where E_3 was the only experience, and the only proximal stimulus of it was light, and there was only visual sensory processing as a cause of the experience, and the resulting experience had representational content and phenomenal character solely characteristic of vision (whatever one takes those to be) – then E_3 would be a uni-modal_{pure} experience.

²² One might accuse me here of supposing that absences can't be causes and thus that the lack of an experience or sensory processing in one modality can't have an effect on some other experience or sensory processing in some other sensory modality. I was assuming that in the text above, however, harmlessly so, I believe. Even if there is such causal interaction, one should simply deny that that sort of causal interaction should render the verdict that the experience thus causally affected was cross-modal_{overarching}.

The key point of the above discussion is that just because a sensory system receives no input from its associated sensory organ, that does not entail that it is not active. Even if it receives no input from any other part of the brain, it may still be active. Its receiving no input may result in it being in a state which signals something about the world – some absence, as in the case of sound, or some quality associated with some absence, such as light.²³ It may even be producing an experience of some sort associated with that absence.

Three further comments are in order. First, one reason that we must specify that a uni-modal_{pure} experience has solely representational content and phenomenal character characteristic of one sensory modality is to rule out the case of cross-modal synaesthesia counting as uni-modal_{pure}. In cross-modal synaesthesia an experience with phenomenal character and content associated with one sensory modality (the ‘inducer’) causes an experience with phenomenal character and content associated with another modality (the ‘concurrent’ experience) to come into existence.²⁴ The total perceptual experience in that case – the one consisting of the inducer and the concurrent experience – would not be a uni-modal_{pure} experience. Note also that a cross-modal concurrent experience alone could never be a uni-modal_{pure} experience due to its being caused in part by a proximal stimulus and sensory processing associated with a sensory modality other than that associated with its phenomenal character and content.

Second, I have not said that in order to have a uni-modal_{pure} experience, one can only have one sensory modality operative or that one can only be having one experience in one sensory modality. That is, I have not said that one cannot have such an experience when many senses are operative. For all that I have said so far, one could think that one could have a uni-modal_{pure} experience at the same time as one was having other perceptual experiences in

²³ Of course there is another case in which a sensory system may be activated even though it is receiving no input from its sensory organ or organs, and that is when its input comes from another sensory system. Such cases will be considered in §3.1 below.

²⁴ I specify ‘cross-modal synaesthesia’ because many cases described in the literature as cases of synaesthesia involve only additional elements of experience with phenomenal character and content in the same modality coming to exist. One such case is grapheme-colour synaesthesia, where graphemes are experienced as having colours other than that of the ink that they are printed in. In the main text I do mean only cases of cross-modal synaesthesia. I believe that one could have a uni-modal_{pure} experience in non-cross-modal synaesthesia.

other modalities. The question of whether one should think that that is possible is an interesting one, and one that will be addressed in §3.2.1 below.

Third, there are opinions that one could hold about the nature of the lack of a sensory modality, other than those that I have mentioned above, which involve combinations of the views that I outlined. For example, it would not be unreasonable to think that when one is first made deaf or blind one at first has an experience of silence or an experience of blackness, but over time, this is replaced by no experience. Also, someone might also hold that the case of deafness and the case of blindness are different. They might hold that while there is clearly a distinction in the case of blindness between having no visual experience and between having an experience of blackness there is no distinction between having an experience of silence and no auditory experience. I don't take a stance in this paper about which of these positions is correct.

Now that the idea of a uni-modal_{pure} experience has been defined it is possible to think of the various other kinds of uni-modal experience that there could be.

2.2. Uni-modal_{criterion} Experience. Recall that a uni-modal_{pure} experience is uni-modal with respect to *all* of the four criteria (and in addition the modality concerned is the same in each case). One can now imagine a variety of impurely uni-modal experiences designated in accordance with how many of the four criteria a given experience is uni-modal with respect to. It is useful to have a name for these. Call these 'uni-modal_{criterion} experiences'. Thus, if an experience has a proximal cause associated with just one sensory modality then it will be a uni-modal_{proximal} experience. If an experience is produced by just one sensory system then it will be a uni-modal_{sensory-system} experience. If an experience has the representational content associated with just one modality it will be a uni-modal_{representational} experience. If an experience has the phenomenal character associated with just one modality it will be a uni-modal_{phenomenal} experience.

Experiences can be impurely uni-modal in more than one way – an experience could be uni-modal_{proximal} and uni-modal_{representational} for example.

III

Cross-modal Experience. With these various forms of uni-modal experiences clearly defined, we can now start to taxonomise the various forms of cross-modal experience. The first distinction that it is necessary to make, and a very important one, is the difference between an experience being cross-modal across criteria (cross-modal_{across}), as opposed to being cross-modal within a criterion (cross-modal_{within}). I define an experience as cross-modal_{across} if it is a uni-modal_{criterion} experience with respect to at least two criteria for individuating the senses, say uni-modal_{proximal} and uni-modal_{phenomenal} and if the modalities associated with each of these criteria is different. Thus the experience might be a tactile uni-modal_{proximal} experience and a visual uni-modal_{phenomenal} experience. An example would be the experience of phosphenes that one has when one presses on one's eyeball with one's eyelid shut. The proximal stimulus is pressure – the proximal stimulus of touch. The phenomenal character of the experience is visual – one experiences spots and flashes of light. We could label such an experience 'cross-modal_{across-proximal-phenomenal}'.

3.1. *Cross-modal_{across} Experience.* All cross-modal_{across} experiences will be uni-modal_{criterion} experiences with respect to at least two criteria. And if an experience is a uni-modal_{criterion} with respect to each of the four criteria then either it will be a cross-modal_{across} experience or it will be uni-modal_{pure}.

Almost all cross-modal synaesthetic concurrent experiences (thus excluding intra-modal cases of synaesthesia, see §II, in particular footnote 24) will be cases of cross-modal_{across} experiences. Recall that cross-modal synaesthesia involves an inducer experience with phenomenal character and content in one sensory modality causing a concurrent experience with phenomenal character and content in another modality. For example, inducer experiences of sounds might cause synaesthetic concurrent colour experiences. The concurrent experience in this case is visual uni-modal_{phenomenal} and visual uni-modal_{representational} – but its proximal stimulus is that which caused the sound inducer experience. Typically, this will be pressure waves in a medium, and, when it is, the concurrent experience will be auditory uni-modal_{proximal}. Only in cases where the inducer experience that causes the concurrent experience does not have its standard uni-modal proximal cause could the

concurrent experience not be cross-modal_{across}. Such cases might include hallucinations of auditory experiences in which the hallucinatory auditory inducer experience is not caused by stimulation by pressure waves in a medium. (Concurrent experiences may, of course, exhibit other forms of cross-modality – as we will see in due course.)

Whether there can be any cases of experiences that are cross-modal_{across-representational-phenomenal} is an extremely controversial question. Representationalists – those who are committed to either the identity of phenomenal character and representational content or the supervenience of each on the other – would deny this. But those who reject representationalism need not.

3.2. *Cross-modal_{within} Experience.* I now turn to consider cross-modal_{within} experiences. These are by far the most interesting cross-modal experiences. When people talk of cross-modal experiences in the literature it is usually one or other kind of cross-modal_{within} experiences that they have in mind. Cross-modal_{within} experiences are ones that are not uni-modal_{criterion} experiences with respect to at least one of the criteria for individuating the senses. For example, a cross-modal_{within-proximal} experience is one that is caused by the proximal stimuli associated with more than one sensory modality. One model of what happens in the sound-induced illusory flash illusion would suggest that the experience had during it is of this kind. According to this model, the auditory system, stimulated by the proximal stimulus of pressure waves through the air, causally affects the processing in the visual system, which is stimulated by light, so that the visual system yields a visual experience as of two flashes. Such an experience would be cross-modal_{within-proximal}. Many cross-modal_{within-proximal} experiences, such as this one, will also be cross-modal_{within-sensory-system} experiences and vice versa, although not necessarily all. It is to cross-modal_{within-sensory-system} experiences that I turn my attention in the next section. In the section following that, I will examine cross-modal_{within-representational} and cross-modal_{within-phenomenal} experiences. I will not consider cross-modal_{within-proximal} experiences further as their nature is straightforward compared to the other kinds.

Before continuing, note that, as I have defined cross-modal_{across} and cross-modal_{within} experiences, experiences can be both cross-modal_{across} and

cross-modal_{within} but they can be one without being the other. Also, any experience will be – using the exclusive sense of ‘or’ – either uni-modal_{pure} or cross-modal_{across} or cross-modal_{within} or both cross-modal_{across} and cross-modal_{within}. These categories thus provide an exhaustive taxonomy of experience. Therefore note that I introduced the category of uni-modal_{criterion} experiences simply as it provides a convenient terminology with which to explain some of these other categories.

3.2.1. *Cross-modal_{within-sensory-system} Experience.* There is much to say about cross-modal_{within-sensory-system} experiences, which is why they are assigned a subsection of their own. These are ones that are caused by the interaction of more than one sensory system. These, I believe, are what scientists mostly have in mind when they talk of cross-modal experiences. As mentioned in the introduction, scientists are keen to distinguish two forms of multisensory processing – that which involves multisensory integration and that which does not, but is instead mere multisensory processing. The former occurs when information from two sensory organs is combined in the brain to yield genuinely new information – information that is not a mere summation of the information deriving from each sense organ. Moreover, the more integrated the processing is, the more this new information cannot be further easily manipulated, so as to separate out again the information derived from each sensory organ.

Note two things here. First, the scientists are conceiving of the sensory systems primarily as consisting of information-carrying states. I will assume that this is the case. Second, talk of ‘new’ information here means relative to that which is in each of the sensory systems at the time of or just before multisensory processing takes place. Thus, the information could be information that one sensory system could have produced alone in different circumstances. The information is new compared to that which was at a previous time in the system. Of course there may be some cases where the information produced is new in the stronger sense – no one sensory system alone could have produced it – as we will see below.

To see the difference more clearly between mere multisensory processing and multisensory integration, consider the following two cases. Case 1: suppose that the visual system carries information about something round being present at a particular location and the auditory system carries

information about something loud being present at that location. One could imagine that a combination of these signals might lead to a state that carried the information that something round and something loud was present at that location. Such an information-carrying state would be a state involved in mere intersensory processing, not in multisensory integration. There is one state that carries the information that two states used to carry.

Case 2 is the kind of case that scientists call multisensory integration. Consider the McGurk effect again. One plausible story, although, as we will see, not by any means the only plausible story, about what is happening in the McGurk effect is that the auditory system starts to process auditory information based on just the stimulus impinging on the ears – the /ba/ sound. The visual system also starts to process visual information based purely on the stimulus that impacts the eyes – the /ga/ sound inducing lip movement. At some point a comparison is made concerning what information the auditory and visual systems have about what was happening at a certain place and time and the information is found to be incompatible. The sound could not have been made by the lip movement. The auditory information is then altered to /da/ so that the information about what sound was present is more nearly compatible with the information held about the lip movement (for the /ga/ sound lip movement is very similar to the /da/ sound lip movement), while the visual information stays the same. The resulting informational state concerning what the sound was is now new information. Neither the auditory nor the visual system carried that information previously. In addition, the resulting states of each of the sensory systems determine an experience – a visual one that represents the mouth movement that actually happened and an auditory one that misrepresents the nature of the sound.

As described, case 1 and case 2 involve different forms of cross-modal_{within-sensory-system} experience. In case 1, there is a mere multisensory processing kind (cross-modal_{within-sensory-non-integration}) and, in case 2, a multisensory integration kind (cross-modal_{within-sensory-integration}). We can also see that, as described, the sort of new information produced in case 2 is such that one sensory modality could have produced it alone – /da/ is a sound that the auditory system could have represented by itself, for example if it was accurately representing a /da/ sound. Call such an experience a ‘cross-modal_{within-sensory-integration-uni-modal} experience’.

The kind of multisensory integration outlined in case 2 is where only one of the two sensory systems (the auditory one in the example) comes to contain new information. However, one can imagine cases where both sensory systems come to contain new information. Indeed, it is fairly plausible that this may be what is happening in the McGurk effect, rather than the description that I gave of it above. Call the following interpretation of the McGurk effect case 3. It may be that the auditory system starts off by carrying information that /ba/ is present and the visual system that a /ga/ producing lip movement is present. It may then be that the auditory system shifts to contain information about /da/ on account of the fact that it couldn't fit with a lip movement of the sort that has occurred but the visual system shifts too. Rather than represent a /ga/ producing lip movement it now comes to represent the similar but different /da/ producing lip movement. In other words, given the information available to both modalities it may be that the most minimal shift that the whole perceptual system can undertake to make the information it is receiving coherent is to shift both what is represented auditorily and visually. If this is what is going on in the McGurk case then it involves two cross-modal modal_{within-sensory-integration-uni-modal} experiences – a visual one and an auditory one.

There is a further level of multisensory integration that we can identify. Consider case 4, another interpretation of what might be occurring in the McGurk effect. The auditory system might represent the /da/ sound as being produced, or caused, by the relevant lip movement. And, likewise, the visual system might represent the lip movement as the cause of the /da/ sound. Or perhaps there is just one representation somewhere in the brain – perhaps distributed over the auditory and visual systems that represents a /da/ sound caused by a /da/ producing lip movement. Such experiences are not any old cross-modal within-sensory-integration experience. They are special ones. They are ones where two or more sensory systems interacted and information was integrated *and* the information that was produced was itself cross-modal, for it was about the relation between objects and/or properties that are represented in different sensory systems. Thus, these experiences are doubly cross-modal. I label them 'cross-modal within-sensory-integration-c-m experiences'.

A variant of case 1 can be constructed that involves this sort of experience too – call this case 5. Imagine that the new state mentioned in case

I not only represented that something at a location *l* was loud and something at location *l* was round but that some *one thing* at location *l* was round and loud. This information is about the relation between properties that are represented in different sensory systems – that they inhere in the same object. Case 1, thus modified, becomes a case of multisensory integration that involves cross-modal information, for new information is produced and that information is itself cross-modal. In this particular case the cross-modal information is that involved in the phenomenon known as ‘binding’ – that is when different properties detected by different sensory systems are attributed to the same object. These cases involve a particular kind of cross-modal_{within-sensory-integration-c-m} experience that I will call ‘cross-modal_{within-sensory-integration-binding}’.

Finally we can imagine a case where the new information produced was such that it was none of the above – it could not be produced by a single sensory modality, it did not involve cross-modal content of a binding or other kind – it simply consisted of some brand new content. An example of such a case would be one account of flavour experiences.

Much of what the ordinary person considers to be experiences of taste and would believe to be uni-modal_{pure} taste experiences are in fact produced by contributions from both the taste and smell sensory systems (particularly retro-nasal smell)²⁵. It is no surprise that the ordinary person considers these experiences to be experiences of taste for the properties experienced are experienced as being properties of the substance in the mouth and these properties are located as being in that substance and therefore within the mouth. Sometimes the properties experienced are ones that could have arisen in a uni-modal_{pure} taste experience – for example, when the smell of vanilla makes a solution in the mouth taste sweeter than it is. It seems that such an experience of sweetness could have been produced by taste alone, just by finding a suitably sweet solution. However, in many cases it is believed that the experience produced could not have been a uni-modal_{pure} taste experience. It requires both the taste and smell sensory systems to be active. Dispute exists as to whether such experiences are experiences of taste – albeit ones produced

²⁵ Retro-nasal smell occurs (typically when swallowing) when air in the mouth travels from the back of the mouth via the throat and into the nose in the direction opposite to that when we sniff the air in front of us (ortho-nasal smell). Touch – in the mouth and on the tongue – also often makes a contribution to that taken to be taste. This is a further complication that I will ignore at no cost.

necessarily by a causal influence from smell – or whether when taste and smell work together in this way they constitute a new sensory modality – that of flavour. If one accepted the former view then one would have an example of a cross-modal_{within-sensory-integration} experience, where the information produced could not be produced by a single sensory modality, and did not involve cross-modal content – such as the binding kind or the kind where the cause of a property experienced in one modality was attributed to a property experienced in another modality. I call such an experience a ‘cross-modal_{within-sensory-integration-novel} experience’.

If one believes that in such instances one has a new sensory modality of flavour, then clearly one would not describe the experience thus. It might very well be a uni-modal_{pure} flavour experience involving the typical proximal stimuli of flavour (stimuli on the tongue and in the nose), the sensory system of flavour (that typically involved in taste and smell) and the representational content and character typical of a flavour experience. Whether one should adopt the former or the latter interpretation of these flavour cases, I do not adjudicate here.²⁶

3.2.2. *Cross-Modal_{within-r-p} Experience.* At last we come to consider the most interesting forms of cross-modal experience from the philosopher’s perspective: cross-modal_{within-representational} and cross-modal_{within-phenomenal}. As mentioned previously, representationalists think that there can be no difference in representational content without a difference in phenomenal character and vice versa. So they will think that there can be no case of a cross-modal_{within-representational} experience without it being a cross-modal_{within-phenomenal} experience. Whether or not representationalism is true, we have reason to think that representational content and phenomenal character usually go hand in hand, so that there is no difference in one without a difference in the other, at least within subject over reasonably short periods of time.²⁷ This provides a reason to discuss experiences that are cross-modal_{within-representational} and/or cross-modal_{within-phenomenal} together. I will call such experiences ‘cross-modal_{within-r-p} experiences’.

²⁶ Further debate about this issue can be found in Auvray and Spence (2008) and Smith (forthcoming).

²⁷ See Macpherson (2000), chapter 8.

A cross-modal_{within-r-p} experience will be one that has either representational content, or phenomenal character, or both, associated with two or more modalities. I will outline the different forms of cross-modal_{within-r-p} experience by first considering various combinations of uni-modal_{pure} experiences and then considering cross-modal_{within-r-p} experiences formed in other ways.

In §II, I outlined the notion of a uni-modal_{pure} experience. Consider a case in which someone has two uni-modal_{pure} experiences associated with different modalities at the same time – say an auditory uni-modal_{pure} experience as of birdsong and a visual uni-modal_{pure} experience as of trees.²⁸ There are in fact three different situations that might occur when a person has these two experiences and a fourth, closely related, situation.

The first is that both the auditory uni-modal_{pure} experience and the visual uni-modal_{pure} experience are in the one single stream of consciousness of the person. That is, the experiences are ‘phenomenally unified’ for there is ‘something that it is like’ for the subject to have both experiences at the same time. Furthermore, according to this account, although one has two uni-modal_{pure} experiences, these constitute a ‘larger’ or ‘total’ experience. The total experience is not uni-modal_{pure} or uni-modal_{criterion} for it has phenomenal character and representational content associated with two modalities and will involve two sensory systems being operative and will be caused by two different proximal stimuli. Furthermore, in this situation, the phenomenal character and the representational content of the total experience are simply the sum of the phenomenal character and the representational content of the visual uni-modal_{pure} experience and the auditory uni-modal_{pure} experience. In light of this, I will call the kind of experience that this account posits a ‘cross-modal_{within-r-p-two-pure} experience’.

We can contrast this case with the case of a person who has two uni-modal_{pure} experiences that are not phenomenally unified. Such a case could occur in a split brain patient, at least according to the standard theory of the nature of such cases. (It should be stressed that there are other theories of what is occurring in such patients, which I will not consider here.²⁹) Split-brain

²⁸ We could equally think about what would happen were we to have two experiences that were both uni-modal_{representational} and uni-modal_{phenomenal}. But, for ease of exposition, I will stick with the discussion in the main text of the uni-modal_{pure} cases.

²⁹ See, for example, the alternative offered by Bayne (2008).

patients have the two hemispheres of the brain severed by means of cutting the corpus callosum. The left-hand side of the visual field is processed by the right hemisphere of the brain and the right-hand side of the visual field by the left hemisphere. If one takes care to present a different stimulus to each half of the visual field and then one elicits behavioural responses concerning what was seen driven by each hemifield, the responses suggest that each hemisphere represented one and only one of the stimuli. (The left hemisphere governs language and what the right hand does, so that which was presented to the right visual field, and only that, is reported verbally and indicated by actions performed with the right hand, whereas the right hemisphere determines what the left hand does and its response indicates only that which was presented in the left visual field.) According to the standard theory, what is going on in such patients, at least in the special conditions just mentioned, is that the patients have two separate streams of consciousness, one associated with each hemisphere of the brain. The experiences in these hemispheres are not phenomenally unified, any more than my experience now is unified with yours. The person is having two uni-modal_{pure} experiences – two visual ones in the case just described. We can imagine other circumstances in which we caused a visual uni-modal_{pure} experience in one hemisphere and an auditory uni-modal_{pure} experience in the other. In these split brain cases, understood in line with the standard theory, the subject has two uni-modal_{pure} experiences, but they merely have these two experiences. There is no larger cross-modal experience that they constitute.

A third account of what happens when someone has two uni-modal_{pure} experiences is motivated by a particular view of phenomenal unity – a view that denies that the first case outlined above occurs. According to it, when a subject has two experiences that are in the same stream of consciousness then the phenomenal character of the total experience consists in more than the sum of the phenomenal character of the two experiences that are unified. The idea is that if the experiences are phenomenally unified then there must be something that it is like to have each experience and, in addition, something that it is like to have the two experiences together. For example one might interpret Tim Bayne as holding this view based on what he says in this quotation:

Experiences, when they occur simultaneously, do not occur as phenomenal atoms but have a conjoint phenomenology—there is something it is like to have them together, and they are so had. There is something it is like to taste a well-made macchiato, there is something it is like to have a word on the tip of one’s tongue, and there is something distinctive that it is like to enjoy these two phenomenal states *together*. (Bayne, 2008: 280)

As we will see, this is the interpretation of Bayne’s view held by Michael Tye. (However, Bayne is not as clear about this matter as one might like. Thus, while I will interpret Bayne as holding this view for the rest of this paper, as does Tye, note that it is actually less clear to me than I would like it to be that this interpretation accurately reflects his position.³⁰)

On this view, if one has an auditory uni-modal_{pure} experience and a visual uni-modal_{pure} experience in the same stream of consciousness then one’s total experience will not simply consist of a cross-modal_{within-r-p-two-pure} experience but that plus some further phenomenology. I will call this ‘unity phenomenology’ but one needn’t suppose that the phenomenology itself is of or about unification. In such a case, I will say that one’s total experience is cross-modal_{within-r-p-two-pure-plus-unity}. This experience has three phenomenological parts as constituents – the two uni-modal_{pure} experiences plus the unity phenomenology. One might deny that one should think of the unity phenomenology as comprising an experience itself – a ‘unity experience’ as I will call it – on the grounds that one could not have this phenomenology alone. However, I will speak of it as comprising an experience and simply set aside this reason for not doing so. As we will see, Tye’s objection to this view

³⁰ In a later work, Bayne might be interpreted as claiming that this is not his view. He says, ‘Why could there not be something it is like to have a set of unified experiences, without that ‘what it’s like’ subsuming or involving an experience *of* the unity relation that binds the experiences in question together? Phenomenal unity is a phenomenal relation in the sense that it makes a phenomenal difference, but not in the sense that it has its own phenomenal character that makes an *additional* contribution to what it is like to be the subject in question. We can think of this in terms of the different *ways* of undergoing experiences [e1 and e2]. In principle, one can have these experiences separately, or one can have them together, as parts of a subsuming experience. Unity then is not an *object* of experience but a *manner* of experiencing.’ (2010: 31-2) However, it is not clear whether to read Bayne here as saying that there is no additional phenomenal character *at all* to the experience that one has when e1 and e2 are unified or whether he is saying that there is merely no additional phenomenal character that involves an experience *of* the unity relation.

speaks of this element of phenomenology as an experience. However, the force of the objection does not turn on this. One could run a version of his objection that is equally damaging to Bayne's view that led to a regress of elements of phenomenology, rather than, as it does, experiences. And, in addition, I will be arguing below that debate about whether we should rightfully say that parts of experience are experiences is merely terminological. And while I argue this below only with respect to parts of experience that could be had alone, I think that this equally applies to parts of experience that could not. In any case, the cross-modal_{within-r-p-two-pure-plus-unity} experience is a second kind of cross-modal_{within-r-p} experience.

Consider again the unity phenomenology in the cross-modal_{within-r-p-two-pure-plus-unity} experience. It is not obvious that there is any representational content associated with such phenomenology (although see below). It is the extra phenomenology that occurs when two experiences are in the same stream of consciousness; therefore there is no obvious feature of the world that is being represented by such phenomenology. Some theorists will be untroubled by this, however, as we have seen, representationalists will wish to resist this. One representationalist who has written about this is Michael Tye (2003), whose account of phenomenal unity requires us to consider a fourth case closely related to the three cases above.

Tye claims that theories of phenomenal unity, like Bayne's, that hold that when two experiences are phenomenally unified there must be a further experience that unifies them, face the problem that they entail that there is an infinite regress of experiences. He asks us to consider the extra experience consisting of the unity phenomenology. This experience is in the same stream of consciousness as the two original experiences that we were considering. (In our example, but not in Tye's, these were two uni-modal_{pure} experiences.) Thus, this extra unity experience will need to be unified with the two uni-modal_{pure} experiences and thus, on pain of consistency, Bayne's theory must posit further experiences that do this unifying – unity experiences associated with the unity of the unity experience with each of the two uni-modal_{pure} experiences. However we will then have to posit further experiences that unify these experiences with the others and so on – ad infinitum.

Thus, Tye rejects Bayne's theory of phenomenal unity. He holds that one doesn't have to posit the existence of extra unity phenomenology to

explain the phenomenal unity of conscious – in accord with the first case I outlined above. However, in contrast with the first case, Tye claims that when one has a phenomenally unified experience of the sound of birdsong and the visual appearance of the trees, one's total experience is not divisible into parts each of which is an experience – be they uni-modal_{pure} experiences or any other sort. Thus, he denies that cross-modal_{within-r-p-two-pure} experiences exist. Tye does not, of course, deny that one could have an auditory or a visual uni-modal_{pure} experience. Nor does he deny that one can have an experience with auditory and visual elements. Nor even would he deny that one can have an experience comprised of all and only the phenomenal character and representational content that an auditory uni-modal_{pure} experience and a visual uni-modal_{pure} experience would have, were they each had alone. He just doesn't think that when one has such an experience any proper parts of it constitute experiences, even though if they were had alone they would constitute experiences – including the parts corresponding to an auditory or visual uni-modal_{pure} experience.

In order to explain the metaphysics of this view, Tye provides us with an analogy comparing experiences to statues. Imagine that one had two statues each made out of a lump of clay. One might hold the following view about the metaphysics of statues: if one stuck the two lumps of clay together one would merely have one large statue – it would not have two smaller statues as parts. It does have two smaller lumps of clay as parts, but these are only statues when they are not part of the larger whole. So it is true that if one had each of those lumps separated from each other then they would be statues, but while they are stuck together those smaller lumps of clay are not statues.

Likewise, Tye claims that when one has elements of representational content (which for him are elements of phenomenal character) in one stream of consciousness, which do not constitute the totality of the stream of consciousness, those elements do not themselves constitute experiences. This is so even if those elements would constitute experiences were they to constitute the totality of a stream of consciousness.

One reason that Tye adopts this view is that he wishes to distinguish two cases: the case in which one has two experiences that are not phenomenally unified (as in the split brain case) and an experience that is

phenomenally unified that has the contents and phenomenology of what would otherwise be two experiences as parts. Given that Tye does not wish to distinguish these cases by saying that in the phenomenally unified case one has extra phenomenology, he does it by saying that in the non-phenomenally unified case one has two experiences, whereas in the case that exhibits phenomenal unity one does not have two experiences. One merely has one experience with the content and phenomenal character equivalent to the sum of the two experiences.

Thus, in contrast with the first case, Tye holds that if one has two uni-modal_{pure} experiences then one cannot have a cross-modal_{within-r-p-two-pure} experience. According to Tye, one can either have two uni-modal_{pure} experiences, in which case one is in the split brain situation, or one can have an experience that is comprised of the content and phenomenal character that an auditory uni-modal_{pure} and a visual uni-modal_{pure} experience would have, but such an experience does not have parts that are experiences. Call that experience a ‘cross-modal_{within-r-p-two-pure-Tye} experience’.

One might wonder whether there really is a difference between a cross-modal_{within-r-p-two-pure} experience and a cross-modal_{within-r-p-two-pure-Tye} experience. Might Tye’s refusal to call the parts of a cross-modal_{within-r-p-two-pure-Tye} experience themselves experiences (at least those parts that could be had one their own and were they to do so would constitute experiences) be merely a terminological quirk on his part? Might a dispute between a person who held that the parts were experiences and Tye be merely a terminological dispute about how to use the word ‘experience’? After all, both are agreed that the following counterfactual is true: were the parts of the total experience – parts that have phenomenal character and content – had by themselves they would, in those circumstances, constitute an experience.

Tye would, I believe, think that the matter is not merely terminological. I think that his most plausible defence here is to invoke his claim that if one holds that the parts are themselves experiences then one needs to explain what the difference is between having two experiences that are phenomenally unified and hence form part of a larger, total experience and having two experiences that are not phenomenally unified (as in the split brain case). In other words, he should rest his defence on his claim that, if you do not advocate his view, you need a substantial theory of phenomenal unity.

Such a view will be difficult to come by, thinks Tye. We have already seen how one such account – Bayne’s – is problematic. Tye’s view, in contrast he would claim, contains within it the resources required to explain the difference between the case in which two experiences are phenomenally unified and the case in which they are not. In the split brain case there is an auditory experience and a visual experience. In the ordinary case ‘there are no sense-specific experiences to be unified’ (Tye 2003, p. 36). There is just one overarching experience with multi-modal contents.

But should this defence of Tye persuade us? I think not, and for two reasons. The first is that a slight variant on Tye’s view has very similar resources to explain the difference between the split-brain case and the other case, yet does not deny that experiences can have experiences as parts. According to that view, in the split brain case there are two experiences that do not form one experience whilst in the phenomenally unified case there are also two experiences – it is just that they do form one larger experience. On this view one explains the difference between the cases by citing the different *overall* experiences that are had, but one doesn’t deny that experiences have experiences as parts.

One might be tempted to think that such a view is not really explanatory of the difference between the split brain case and the phenomenally unified case. It simply states what the difference is without explaining it. I have sympathy for this worry. But notice that if one holds it then it would be easy to think that the same charge can be pressed against Tye. What extra explanatory advantage does he get from insisting that some of the parts of experience are not experiences? It seems to me none. And we can see that there is still an explanatory task that Tye has to complete, which he has not, which we can state in a way compatible with his theory. It is to explain what is it that explains why certain contents and phenomenal character do not constitute one experience in the split brain case but do in the phenomenally unified case. In virtue of what do the contents and phenomenal character enter into the one experience in the phenomenally unified case? Thus, we have a second reason to doubt that Tye’s view is anything more than a terminological variant of a view that allows experiences to have experiences as parts: his view does not really provide an explanation of phenomenal unity, certainly not one

more substantial than a close variant that does allow experiences to have experiences as parts.

Therefore, I submit that Tye's view is a mere terminological variant of the opposing view. If that is true, then in fact there is no difference between a cross-modal_{within-r-p-two-pure} experience and a cross-modal_{within-r-p-two-pure-Tye} experience. However, for those who disagree, it is useful to have this terminology on the table so that we can make our disagreement clear.

Thus far, in considering cross-modal_{within-r-p} experiences, that is experiences that have representational content and/or phenomenal character associated with more than one sense, we have been considering cases in which there are two uni-modal_{pure} experiences in different modalities present. Cases very similar to these could arise from two uni-modal_{representation} experiences in different modalities and/or two uni-modal_{phenomenal} experiences in different modalities occurring at the same time. Exactly the same sort of discussion could be had regarding these. There are cases where such experiences would not be phenomenally unified, as in a split-brain case, or in the case where these experiences are had by different subjects, and so we would not have a cross-modal experience. In cases where such experiences are phenomenally unified there will be those who hold that the content and phenomenology is simply a summation of the two experiences. I will call these 'cross-modal_{within-r-p-two-criterion} experiences'. And there will be those that hold that the content and phenomenology is a summation of that of the two experiences plus some additional phenomenology of unity: cross-modal_{within-r-p-two-criterion-plus-unity} experiences. And the question will arise whether the cross-modal_{within-r-p-two-criterion} experiences are different from cross-modal_{within-r-p-two-criterion-Tye} experiences – experiences that Tye would claim cannot be decomposed into experiential parts, or whether these are the same and Tye's view amounts to no more than a terminological variant of that view.

All these cases are cases where the cross-modal representational content and phenomenal character in question is formed from either a simple addition of the component contents and characters or that, plus some additional unity phenomenology. But one can also imagine cases that do not consist in being totalities of two uni-modal_{pure} or two uni-modal_{criterion} experiences (or, indeed, one uni-modal_{pure} and one uni-modal_{criterion} experience). Such cases would involve representational contents and characters

not describable in terms of simple summations of contents and characters from different modalities.

We can see what these cases are by revisiting the discussion had in the section on cross-modal_{within-sensory-integration} experiences – where new information was created by two sensory systems interacting. Before doing that, let me make clear the relationship between cross-modal_{within-sensory-system} experiences and cross-modal_{within-r-p} experiences. Not all cross-modal_{within-sensory-system} experiences will be cross-modal_{within-r-p} experiences. Recall the interpretation of the McGurk effect according to which all that is happening is that the visual system causes the auditory system to represent /da/ rather than /ba/. If the information in the sensory system that represents /da/ determines the content of the auditory experience, which seems likely, then such a cross-modal_{within-sensory-integration-uni-modal} experience is not cross-modal_{within-r-p}. It is a simple uni-modal_{representation} and uni-modal_{phenomenal} experience because it has the content and character associated with just the one sensory modality – audition. Whether an experience is cross-modal_{within sensory-system} depends on the nature of the sensory processing, not on the content or character of the experience. Although such multisensory processing may be reasonably likely to produce a cross-modal_{within-r-p} experience, it needn't. Similarly, a cross-modal_{within-r-p} experience is likely to be produced by multisensory processing, but it needn't – as, for example, the case of the totality of two uni-modal_{pure} experiences illustrates.

Turning back now to consider cross-modal_{within-r-p} experiences that are not a totality of two uni-modal_{pure} or two uni-modal_{criterion} experiences (or indeed one uni-modal_{pure} and one uni-modal_{criterion} experience). Such experiences must have content or phenomenal character that is cross-modal in a way that does not involve simple summations of uni-modal content or character. As we saw in the cross-modal_{within-sensory-integration} cases, cross-modal information that does not amount to mere summation of other information could be that involved in binding. In the case of the representational content of experience, this would amount to representing that two properties, each of which are associated with different modalities, are properties of the one object. Or it could involve representing some other relation between objects and/or properties that are represented in different sensory systems – such as that one

produced or caused another. Such experience I will label ‘cross-modal_{within-r-p-c-m}’ and the special form that involves binding ‘cross-modal_{within-r-p-binding}’.

Could there be any other forms of cross-modal_{within-r-p} experiences? Recall the cross-modal_{within-sensory-integration-novel} experiences. These occurred when sensory integration produced new information that was neither uni-modal nor cross-modal in the sense of representing a relation between objects and/or properties that are represented in different sensory systems. Could there be an equivalent kind of cross-modal_{within-r-p} experience – a cross-modal_{within-r-p-novel} experience? This would be one that had a content or phenomenology that was cross-modal but not the mere summation of contents in other modalities nor cross-modal in the sense that it related objects and/or properties in different modalities.

One might be tempted to think that experiences of flavour provide examples. In particular, flavour experiences that have a phenomenal character and content that can only be produced by both the smell and taste sensory systems being stimulated in tandem. Recall that there were two views of experiences that the ordinary person would think of as taste experiences but that are in fact produced by both the taste and smell sensory systems. The first is that there is a new sensory modality in operation – flavour. The second is that there is simply a taste experience causally influenced by smell. On the former view, the experience is a flavour uni-modal_{phenomenal} and flavour uni-modal_{representational} experience not a cross-modal_{within-r-p} experience at all. While the existence of a new sensory system with a new phenomenology is interesting and makes the experience worthy of note, it does not make it a cross-modal_{within-r-p-novel} experience.

On the latter view, the experience is a cross-modal_{within-proximal} and a cross-modal_{within-sensory-integration-novel} taste and smell experience but one should not think that the experience is a taste and smell cross-modal_{within-r-p-novel} experience. The reason is that, on this view, the experience just has the phenomenal character and content associated with the taste modality. This is a taste uni-modal_{phenomenal} and taste uni-modal_{representational} experience – albeit one that is cross-modal_{proximal} and cross-modal_{within-sensory-system}.

Let me dwell on this second view of taste a little longer. If one held it, one might erroneously think that some cases of experiences produced by both the taste and smell modalities were cross-modal_{within-r-p-novel} experiences –

namely those whose phenomenal character and/or content can only be produced by the taste and smell sensory systems working at the same time. However, this would be wrong. The phenomenology and/or content is novel compared to that which can be produced by the taste sensory system alone – and so is an interesting and unusual experience – but the phenomenal character and/or content on this view is the phenomenal character and/or content associated with the taste modality. While the phenomenology is novel relative to that which taste alone can produce, and is cross-modal in the sense that it can only be produced by two sensory systems, it is not cross-modal in the sense that it has connections to both taste and smell *phenomenology*, which is what is required here to make the experience cross-modal_{within-r-p-novel}. No. It has merely taste phenomenology. It has no olfactory *phenomenology*, which would be required to make it cross-modal *in the relevant respect*. The phenomenology, as noted before, is only as of properties of objects in the mouth – phenomenologically, the contribution of the nose is silent – which is why the vast contribution of smell to taste surprises us when we first encounter it. This is precisely the fact that motivates the adoption of this view of such experiences – that they are taste experiences.

Is there another example then that we might consider? Recall the extra unity phenomenology that Bayne's theory postulated. That phenomenology does not belong to any single modality nor is it a summation of the phenomenology of the experiences that occur when it occurs. How should we classify it? Recall, also, that I said that one might think that this extra phenomenology was not representational. If one were to deny that view, then the most plausible candidates for what the unity phenomenology represents are that the experiences, or the contents of the experiences, that occur when it occurs, are experienced together or occur together at the same time. If that is right then the unity experience should be classified as a cross-modal_{within-r-p-c-m} for it represents a relation between objects and/or properties that are represented in different sensory systems. However, one might be tempted to also classify the unity experience as amodal because it arises from amodal perception, in the second sense of that term outlined in the introduction – it arises from the perception or apparent perception of objects, properties or relations that are not perceived through one, or more, senses. One might think that because one thinks that the experiences, or the contents

of experiences, that the unity experience is of do not come to be represented by either of the sensory modalities that produced them. The experience or contents of experiences are not apprehended by a perceptual sense – rather, by some sort of introspective faculty.

However, if one thought that the unity phenomenology was not representational then I believe that it is the best candidate there is for being a cross-modal_{within-r-p-novel} experience. It is a novel phenomenology that is not a mere summation of phenomenologies in other modalities and does not represent relations between properties and/or objects associated with different modalities. It is also clearly linked – and phenomenally linked – to the two modalities of the experiences which it accompanies. So one might classify the novel phenomenology as associated closely enough with these two modalities to count as cross-modal_{within-r-p} and yet novel so as to count as cross-modal_{within-r-p-novel}. However, whether we ought to hold that is questionable. After all, the phenomenology is, by definition, different to the other experiences in each modality. And if one held that the experience of novel phenomenology, while having the two modalities as part of its causal ancestry, was nonetheless more directly produced in the fashion outlined in the previous paragraph – by introspection – then the novel phenomenology would perhaps be best not characterised as cross-modal_{within-r-p novel} - but rather as amodal.

In any case, as we saw above, the existence of unity phenomenology is highly disputable, and other candidate cases for being cross-modal_{within-r-p-novel} experiences are few and far between. Thus, it is not clear whether there are any candidates for being cross-modal_{within-r-p-novel} experiences, even if, in the end, we are not sure whether such cases should be classified as amodal instead.

IV

Hallucinatory Experience and Introspectible Properties of Experience. Above, I have only considered experiences involved in perceiving the world. I have not discussed such experiences' hallucinatory counterparts (if indeed they have hallucinatory counterparts). I will do so only briefly here, passing over some of the more subtle considerations one might adduce. A hallucinatory counterpart of an experience had whilst perceiving is an experience had whilst not perceiving, but which has the same phenomenal character and the same

representational content as the one involved in perceiving the world.³¹³² Thus, a hallucination's identity depends on its phenomenal character and representational content, not its proximal cause or the nature of the sensory process that produces it. This entails that, with respect to classifications of experience as uni-modal or cross-modal that rely only on their representational or phenomenal properties, the hallucinatory counterparts of such experiences will be uni-modal or cross-modal when and only when the non-hallucinatory counterpart is. Such classifications include uni-modal_{representational}, uni-modal_{phenomenal}, cross-modal_{across-representational-phenomenal}, cross-modal_{within-representational}, and cross-modal_{within-phenomenal}. However, perhaps somewhat surprisingly, with respect to classifications of experience as uni-modal or cross-modal that rely only on their proximal stimuli or sensory system properties, hallucinatory counterparts of those experiences need not be uni-modal or cross-modal when the non-hallucinatory counterpart is. Such classifications include uni-modal_{pure}, uni-modal_{proximal}, uni-modal_{sensory-system}, cross-modal_{across} (involving proximal stimuli or sensory system properties), cross-modal_{within-proximal} and cross-modal_{within-sensory-system}.

The resolution of another issue turns on the difference between representational and phenomenal properties of experience, on the one hand, and proximal stimuli and sensory system properties, on the other. That is whether one can tell via introspection whether an experience is uni-modal or cross-modal. To the extent that introspection yields data on the representational content and phenomenal character of an experience, which frequently it does, then one will in some circumstances be able to classify one's experience as a uni-modal or a cross-modal type only with respect to types that rely only on the representational or phenomenal properties of experience, examples of which were given in the previous paragraph. One will be able to do so when one knows what the typical phenomenal character and content

³¹ On many views of content, perceptual experiences and their hallucinatory counterparts will have the same representational content, but not quite all. On some views perceptual experiences have contents such as 'o is P' where 'o' is the object seen. In hallucinatory counterparts of these experiences the content takes the form ' _ is P'. There is no object that fills the place of 'o' and so the content is 'gappy'. Despite this difference there are taken to be many similarities in the content. See, for example, Schellenberg 2010.

³² According to some disjunctivists, when one has a hallucination one does not have an experience and/or one does not go into a state that has the same phenomenal character as exists in the perceptual case. On this view there are no hallucinatory counterparts to perceptual experiences, as I have defined them.

associated with a modality is. But one will not be able to introspectively classify one's experience as a uni-modal or a cross-modal type with respect to types that rely on the proximal or sensory system properties of experience, for these are not introspectible properties. For example, recall that it was often surprising to learn that certain experiences were produced by multisensory processing or integration, such as the auditory experience one has in the McGurk effect.

V

Conclusion. I have been describing different forms of cross-modal experience. I hope that I have provided an exhaustive taxonomy of such forms. However, no doubt many further questions could be raised. For example, suppose one had two token senses of the same type. Does one have a cross-modal experience if there is interaction between these tokens? In a sense the answer is yes, and in a sense, no. Perhaps we simply have to identify cross-modal interactions that involve tokens of different types of senses and those that involve different tokens of the same type.

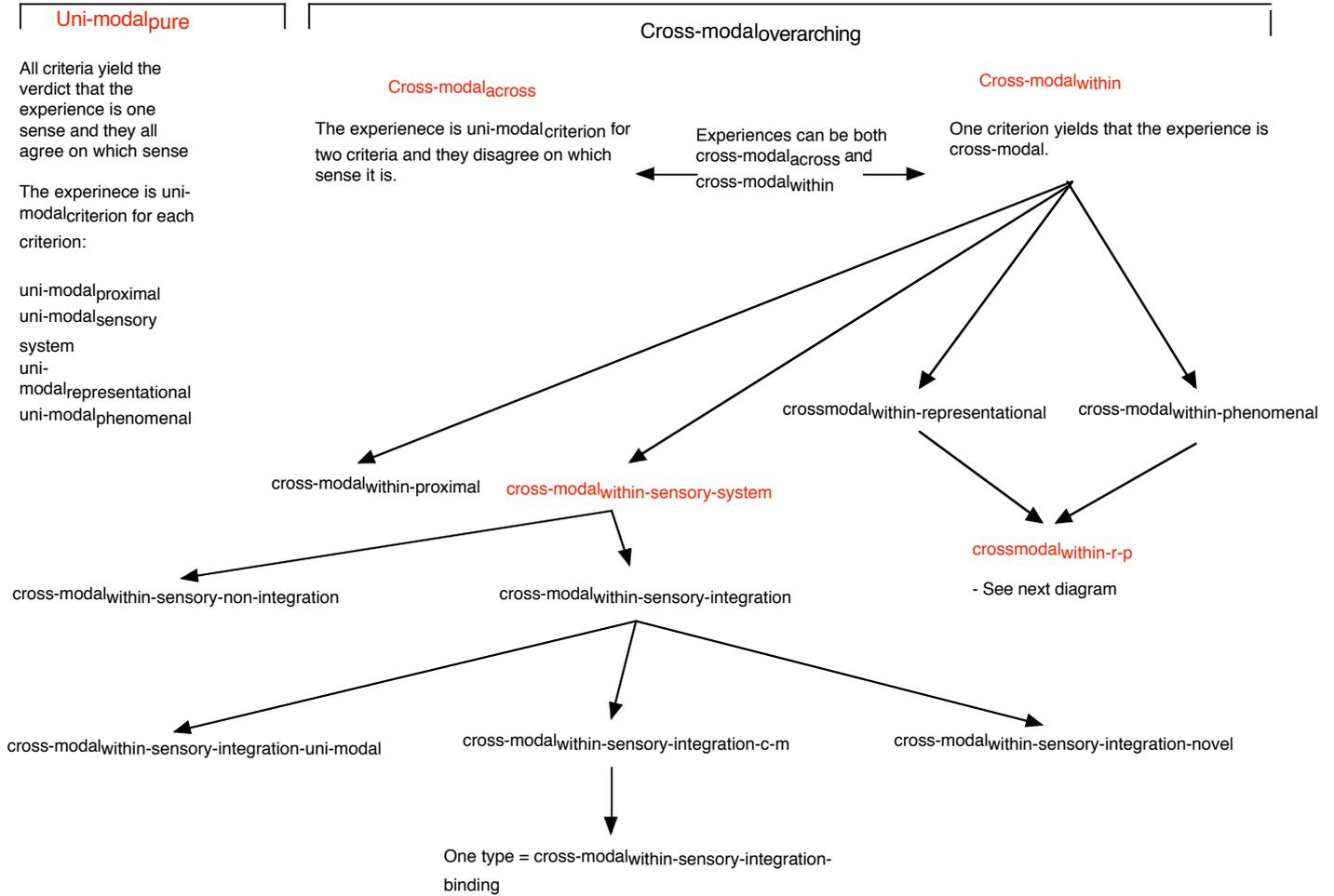
Outlining the ways in which experience can be cross-modal does not by itself allow us to solve any philosophical questions relating to the senses and their interaction, nor does it determine the nature of the experiences involved in many cases where cross-modal effects are at play. However, I believe that providing a useful taxonomy of cross-modal experiences is the first step on the way to finding out the answers to these questions by allowing us to think clearly about the myriad forms of cross-modality that there can be and allowing us to hone in on where actual and potential disagreement about the nature of certain cases lies.³³

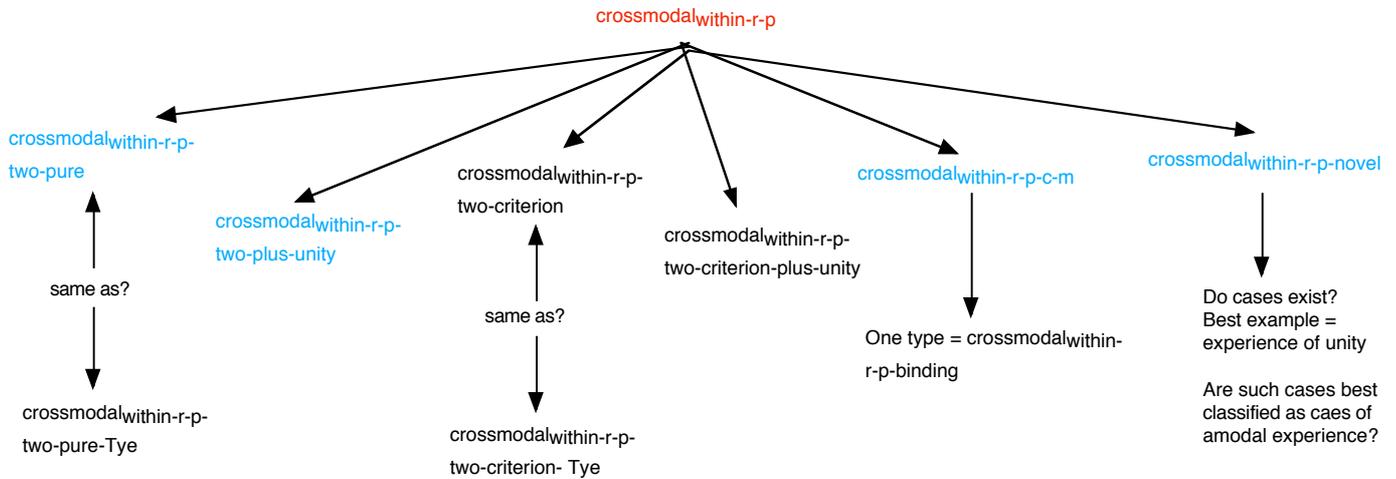
*Department of Philosophy
University of Glasgow,
Glasgow, G12 8QQ*

fiona.macpherson@glasgow.ac.uk

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Summary Tables





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