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Molyneux's Question and the Phenomenology of Shape

by

Shogo Shimizu

A thesis submitted in partial fulfilment of the requirements for the degree of
Doctor of Philosophy in Philosophy

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Abstract

William Molyneux raised the following question: if a congenital blind person is made to see, and is visually presented with a cube and a globe, would he be able to call the shapes before him a cube and a globe before touching them? Locke, Berkeley, Leibniz, and Reid presented their phenomenological view of shape perception, i.e. their view as to what it is like to perceive shape by sight and touch, in responding to Molyneux's Question. The four philosophers shared the view that visual perception delivers no solid shape. This view would provide a premise for an argument for immaterial objects. The purpose of my thesis is to reject that argument. Kant's view and John Campbell's externalist account offer a way to reject the premise of the argument in question. However, my strategy is not to adopt their view. I pursue Reichenbach's view that the there is no congruence or incongruence involved in the visual phenomenology. I develop his view, and propose the view that visual perception delivers no flat or solid shape. Although my view endorses the premise in question, I can offer a way to reject the argument. This is because my view is compatible with a form of externalism about perception (which differs from Campbell's). My view can also do full justice to the phenomenological views presented by the four philosophers.

Introduction

In a letter to Locke, William Molyneux raised a question concerning a congenital blind person who recovers from blindness. If a cube and a globe are put in front of him after he is made to see, would he be able to call them a cube and a globe before touching them? A number of philosophers from the seventeenth century onwards responded to this question. In my view, one of the reasons why Molyneux's Question has provoked diverse responses is that visual perception of shape has an elusive nature, which one might label 'perspectival'. In this thesis, I will consider responses given by Locke, Berkeley, Leibniz, and Reid. Attempting to explain the puzzling nature of visual shape perception, they shared the basic idea that the way visual shape perception is from the first-person viewpoint is in fact different from the way we ordinarily take it to be. As we shall see shortly, this idea would provide a premise for an argument for the existence of immaterial objects. My aim in this thesis is to reject this argument by giving a correct account of the problematic nature of visual shape perception.

In my inquiry, I shall deal with the phenomenology of shape. That is, I shall talk of what it is like to see shape, and what it is like to feel shape by touch. My inquiry concerns the description of what visual perception of shape and tactile perception of shape are like from the first-person viewpoint. Or if the description is such that, strictly speaking, there is nothing it is like to see or feel shape (although it might seem otherwise), my focus would be on the phenomenology of what is ordinarily regarded as visual perception of shape and that of what is ordinarily regarded as tactile perception of shape. I shall talk of the objects involved in the phenomenology of shape perception, or in the phenomenology of what is ordinarily taken to be shape perception. They are objects we encounter when having shape perception, or what is taken to be shape perception, whenever there is something it is like to see or feel objects. I shall call these objects the ‘objects as perceived’ or the ‘objects delivered by perception’. Among them are ‘objects as seen’ (or ‘objects as visually perceived’ or ‘objects delivered by visual perception’) and ‘objects as felt’ (or ‘objects as tactilely perceived’ or ‘objects delivered by tactile perception’). When I consider a phenomenological description according to which the ‘objects as perceived’ have shape, I will use the term ‘shapes as perceived’ or ‘shapes delivered by perception’. ‘Shapes as perceived’ or ‘shapes delivered by perception’ could include ‘shapes as seen’ (or ‘shapes as visually perceived’ or ‘shapes delivered by visual perception’), and ‘shapes as felt’ (or ‘shapes as tactilely perceived’ or ‘shapes delivered by tactile perception’). When I consider a description according to which the ‘shapes as seen’ or ‘shapes as felt’ include a triangular shape, for example, I will use the phrase a ‘triangle delivered by visual perception’ or a ‘triangle delivered by tactile perception’. In addition, I will refer to a perception which delivers shape as a perception *as of* shape. A perception as of shape could be, for example, a visual or tactile perception as of a triangle. (When I say that a physical object ‘seems’ to have a certain shape, I am not giving a phenomenological description. Rather, I will mean what we mean when we ordinarily say that a physical object looks or feels to have a certain shape. It is possible that, for example, although a box ‘seems’ cubical when one looks at or touches it, the object as perceived is in fact not cubical.)

Note that a description of the ‘objects as perceived’ is itself neutral as to what these objects are. They might be a description of mind-dependent, mental objects, or one of mind-independent, physical objects. A description of them concerns the way they are from the subjective viewpoint, rather than what they are. The purpose of this thesis is to criticise an argument which draws a conclusion as to what the objects as perceived are from a particular set of descriptions of them.

Now, let us consider the following argument for the existence of mind-dependent objects. When we move our hands and arms, and describe the objects delivered by tactile perception, the description mentions flat shapes such as a circle, square, etc. and solid shapes such as a sphere, cone, etc. It might seem that flat and solid shapes are also delivered by visual perception. However, if we introspect our visual experience and accurately describe the way the visual experience is from the first-person point of view, the resulting description differs from the description of the tactile phenomenology. The description of the visual phenomenology mentions no solid shape. (This claim as such is neutral as to whether the description of the visual phenomenology mentions flat shapes.) Then, the description of the objects as felt and the description of the objects as seen cannot both be a description of the physical objects around us. For it cannot be true of the same physical environment both that there are flat and solid shapes, and that there is no solid shape. It is possible that neither of the descriptions is a description of the physical objects around us. But if we have to admit that either of the descriptions is a description of the physical objects, it would be the description of the tactile phenomenology mentioning flat and solid objects. Therefore, at least the description of the objects as seen is not a description of the physical objects around us. It is a description of mind-dependent, non-physical objects.

The above argument consists of the following claims:

(C1) The description of the objects as felt mentions both flat and solid shapes.

(C2) The description of the objects as seen mentions no solid shape.

(C3) The description of the objects as felt and that of the objects as seen cannot both be a description of the physical objects around us.

(C4) The description of the objects as seen is not a description of the physical objects.

(C5) The description of the objects as seen is a description of the mind-dependent objects.

My thesis will show that even if we accept (C1) and (C2), which concern the descriptions of the objects as perceived, we can deny (C3), (C4), and (C5) which concern what the objects described are. Although (C1) is not free from dispute, I accept it for my purpose. I also accept (C2), or even develop a view that would support it in the following investigation. I will seek for a way to think that even if we accept (C1) and (C2), we need not be committed to (C3). I will block the step from (C1) and (C2) to (C3). The step from (C3) to (C4) does not presuppose that there are really flat and solid shapes in the environment. Rather, the presupposition is that *if* either the description of the objects as felt or that of the objects as seen is a description of the physical objects around us, the former, which mentions both flat and solid objects, would be. We need not deny the reasoning in this presupposition. Since I deny (C3), I can offer a way to regard both descriptions as descriptions of the physical objects around us. We can avoid accepting (C4) by taking that option. Thus, I will not question the step from (C4) to (C5). My strategy is to block the step to (C3) from (C1) and (C2).

One might attack the argument for (C5) in the following way. The mind-independent situation may be such that, for example, flat and solid shapes are in the hands whilst only flat shapes are before the eyes. Suppose that, in such a situation, the subject describes the objects as felt by saying that there are flat shapes and solid shapes, and describes the objects as seen by saying that there are flat shapes but no solid shape. (C1) and (C2) are true. It can also be true that the description of the tactile phenomenology, mentioning flat and solid shapes, is a description of the flat and solid shapes in the hands, and that the description of the visual phenomenology, mentioning flat shapes but no solid shape, is a description of the flat shapes before the eyes. Hence, it is wrong to draw (C3) from (C1) and (C2). This objection seems coherent. However, it seems to show that an implausible situation is required to avoid drawing (C3) from (C1) and (C2). The advocate of the argument for (C5) would reply as follows. (C1) and (C2) are held regarding the cases we actually encounter (or have encountered). It is highly implausible that we encounter (or have encountered) only cases where the physical situation is as described by the above objection. Moreover, in many of the actual cases, it seems that we look at and touch one and the same solid object. (C2) and (C3) concern even such cases. That is, even in such cases, the description of the tactile phenomenology mentions a solid object, whereas the description of the tactile phenomenology does not. Then, in cases where we seem to look at and touch one and the same solid object, it might be that the description of the tactile phenomenology, mentioning a solid shape, is a description of a solid physical object in the hand, but it cannot be that the description of the visual phenomenology, mentioning no solid object, is a description of a solid physical object. The conclusion is that the latter description is of a non-physical object.

I will endorse (C2) because I think that we should, and can, do most justice to the phenomenological views as to visual experience held by Locke, Berkeley, Leibniz, and Reid. Their accounts of visual experience would all support (C2). They present their views on visual shape perception when they answer Molyneux's Question. I will expound the four philosophers' phenomenological accounts, both of visual shape experience and of tactile shape experience, by providing a coherent understanding of how their phenomenological accounts lead to their answers to Molyneux's Question. Through interpreting their accounts as precisely as possible, we will obtain theses as to the visual phenomenology of shape that would support the claim (C2).

In Chapter 1, I will discuss Locke's negative answer to Molyneux's Question. In Locke's view, whereas tactile perception delivers flat and solid shapes, visual perception delivers flat shapes but no solid shapes. In Chapter 2, I will discuss Berkeley's negative answer. He acknowledges that tactile perception delivers flat and solid shapes, but thinks that visual perception delivers neither flat nor solid shapes. So, the phenomenological views held by Locke and Berkeley, constituting their negative answer to Molyneux's Question, straightforwardly support (C1) and (C2). In Chapter 3, I will deal with Leibniz's answer. Although his answer is positive, his phenomenological view is that perception, visual or tactile, delivers no flat or solid shape. This view does not deny (C2), rather supporting (C2). In Chapter 4, I will clarify Reid's phenomenological account. His account is that tactile perception does not deliver shape, whereas visual perception delivers flat shapes. Thus, the phenomenological accounts put forward by the philosophers answering Molyneux's Question support (C2).

I will offer a way to accept (C1) and (C2) but deny (C3), (C4), and (C5) through the following line of investigation. In Chapter 5, I will introduce Kant's tenet that perception is bound to be three-dimensional and Euclidean. This tenet, entailing that visual perception delivers three-dimensional objects, would be sufficient for rejecting (C2). However, in Chapter 6, I will pursue Reichenbach's claim that visual perception has no Euclidean constraints. Reichenbach's claim is based on the argument that visual perception does not deliver congruence. Since this argument rests on a treatment of a phenomenon called 'perceptual constancy' of shape and size, I will, in Chapter 7, examine explanations of shape and size 'constancy' that would be offered by Christopher Peacocke and Michael Tye. I will show that we should prefer Reichenbach's explanation to the contemporary accounts of shape and size 'constancy'. In chapter 8, I will consider John Campbell's externalist view, which would render (C2) false if (C1) is rendered true. Because there seems to be a difficulty for Campbell's externalism in accounting for a case of shape and size constancy, I will pursue and extend Reichenbach's phenomenological view that congruence is not delivered by visual perception. My view will be that visual perception does not deliver flat or solid shape – that is, the visual phenomenology does not involve flat or solid shape. My view will endorses (C2), doing most justice to the four philosophers' phenomenological views. I will propose that my position is compatible with the externalist position that the physical objects are involved in the visual phenomenology. Since they are compatible, there is a way to avoid drawing (C3), (C4), and (C5) from (C1) and (C2).

Chapter 1:

Locke

In *An Essay Concerning Human Understanding*, Locke introduces a question which William Molyneux raised in a letter to Locke. As we shall see in this chapter, Locke's answer to the question follows from the combination of his phenomenological view and his empiricist view. The aim of this chapter is to clarify Locke's phenomenological account, which constitutes his answer to Molyneux's Question. On my interpretation, Locke thinks that visual perception delivers only two-dimensional shapes whereas tactile perception delivers both two- and three-dimensional shapes. I will reject two interpretations which are incompatible with my interpretation of Locke's view on visual perception. According to the interpretation proposed by Martha B. Bolton and Gareth Evans, Locke's view is that visual perception delivers no shape at all, i.e. that it does not even deliver two-dimensional shapes. On Laura Berchielli's interpretation, Locke thinks that visual perception delivers three-dimensional (as well as two-dimensional) shapes. Having rejected those two interpretations, I will consider how Locke would answer a two-dimensional version of Molyneux's Question. I will support John L. Mackie's interpretation that Locke would answer it positively, and ascribe to Locke the phenomenological thesis that there is no difference between two-dimensional shapes delivered by sight and those delivered by touch. I will conclude that Locke's phenomenological view supports the argument for (C5).

1. Molyneux's Question and Locke's phenomenology of shape

Locke introduces Molyneux's Question in the chapter 'Of Perception'. According to him, what we ordinarily regard as visual perception, in fact, consists of two stages – i.e. the stage of *perception* and the stage of *judgement* based on perception. Molyneux's Question, concerning a congenital blind man who has recovered from blindness, is introduced to illustrate that visual perception involves the first passive stage alone, and that the active ability of judgement at the second stage needs to be acquired by experience. If a person who was born blind is made to see, he would only have passive perception at the first stage, for he is yet to acquire the ability to make judgement on the basis of perception. In other words, the perception itself would be purely manifest in his visual experience. The idea is that our visual experience is the same as the visual experience a formerly blind person would have in that they both consist in the passive stage, the difference being in that our visual experience is added the active stage of judgement. For Locke, passive perceptual experience *per se* is not changed by the additional active stage. It is only that the close relation between the two stages makes it difficult for us to separate them.

In the first section of the chapter on perception, Locke emphasises the passivity of perception.

> … in bare naked *perception*, the mind is, for the most part, only passive; and what it perceives, it cannot avoid perceiving.[1]

The mind is passive when it perceives. Locke thinks that the mind performs activity on the basis of what it passively perceives. A consequence of Locke's account is that

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[1] Locke (1997), II, ix, 1, p. 142.

the active aspect of the mind makes it difficult to correctly describe what is passively delivered by perception, or what is delivered by perception prior to mental activity. Since we are interested in the objects *as perceived*, it is important for us to distinguish between what Locke thinks is primarily delivered by perception in a passive manner, and what he thinks the mind does secondarily in an active manner.

What Locke thinks is passively delivered by perception can be known from what *ideas* he thinks are received before mental activity. For on Locke's account, we receive ideas whenever we have perceptual experience.

> … *wherever there is sense*, or *perception, there some idea is actually produced, and present in the understanding*.[2]

The mind constantly receives some idea so long as it has perceptual experience. Since perception is passive, it would follow that the mind passively receives ideas whenever it perceives. So, to clarify Locke's view on what is passively delivered by perception, we should look at what ideas he thinks the mind receives passively, or what ideas he thinks it receives before or without its activity.

Before we proceed, let us briefly clarify what 'ideas' are for Locke. Locke thinks that perception produces an idea in the mind, or that the mind receives an idea from perception. Put this way, it might seem as though an idea and perception were two separate things in the mind. But they are not. Locke defines an 'idea' as 'whatsoever the mind perceives in itself, or is the immediate object of perception, thought, or understanding'.[3] He also says that 'our ideas being nothing, but actual

[2] Ibid., II, ix, 7, pp. 142-3.
[3] Ibid., II, viii, 8, p. 134. In Book I, Locke defines an 'idea' as an object of thinking. He defines it as 'whatsoever is the object of the understanding, when a man thinks, I have used it to express whatever is meant by *phantasm*, *notion*, *species*, or whatever it is, which the mind can be employed about in thinking' (ibid., I, i, 8, pp. 58-9). But

perceptions in the mind, which cease to be anything, when there is no perception of them'.[4] We can treat Locke's 'idea' as the very thing that is perceived from the first-person point of view. For this reason, when I talk of Locke's 'ideas' in relation to perception of shape, I will use the term interchangeably with the phrase 'shapes as (passively) perceived'.

Locke's purpose of introducing Molyneux's Question is to illustrate his view that the mind can actively change an idea it receives by perception. When there is a globe in front of our eyes, for example, we ordinarily take our visual experience to be as of a globe. On Locke's account, however, that is not right in a strict sense. For the object as passively experience is, in fact, circular. We nevertheless take it as global because our mental activity makes it seem global. Locke writes:

> … the *ideas we receive by sensation, are often* in grown people *altered by the judgement*, without our taking notice of it. When we set before our eyes a round globe, of any uniform colour, *v.g.* gold, alabaster, or jet, 'tis certain, that the idea thereby imprinted in our mind, is of a flat circle variously shadowed, with several degrees of light and brightness coming to our eyes. But we having by use been accustomed to perceive, what kind of appearance convex bodies are wont to make in us; what alterations are made in the reflections of light, by the difference of the sensible figures of bodies, the judgement presently, by an habitual custom, alters the appearances into their causes: so that from that, which truly is variety of shadow or colour, collecting the figure, it makes it pass for a mark of figure, and frames to itself the perception of a convex figure, and an uniform

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from the definition in Book II, it is clear that he also regards it as an object of perception.

[4] Ibid., x, 2, pp. 147-8.

colour; when the idea we receive from thence; is only a plain variously coloured, as is evident in painting.[5]

According to Locke, it is in virtue of a *judgement* made unnoticed that we can have an idea of a globe when a globe is in front of our eyes. Without such a judgement, we would only have an idea of a circle. The mind passively receives an idea whenever it passively perceives. So if the mind passively receives an idea of a circle, that is because perception, which is passive, is as of a circular shape. Perception is not as of a globe. Rather, the mind, based on perception, makes an unnoticed judgement that yields an idea of a globe. Locke asserts that what enables us to make such an unnoticed judgement is a 'habitual custom'. Since the mind has no inborn capacity to make this sort of unnoticed judgement, it needs to acquire the capacity through being trained by repeated experiences. A judgement in question, for Locke, is made on the basis of light and colours.[6] The mind becomes able to make an unnoticed judgement by becoming accustomed to 'what alterations are made in the reflections of light' by different shapes. For example, we become accustomed to the characteristic way that a globe reflects light. My visual perception is as of a circular shape in a case where a globe is before my eyes, in a case where a circle is before my eyes, in a case where the top of a cone points to my eyes, and so on. But the circular shape as seen is shaded in a peculiar way in each of these cases. It is in virtue of this that I, although the shape as seen is a variously shaded circle, come to be able to have an idea of a uniformly coloured globe.

For Locke, there are two stages involved in what we take to be visual perception of shape. The first stage is genuinely perceptual. At this stage, a two-dimensional

[5] Ibid., II, ix, 8, pp. 143-4.
[6] This view held by Locke is explicitly pointed out by Berchielli. See Berchielli (2002).

shape, e.g. a circle, is delivered by sight in a purely passive manner. At the second stage, we actively obtain an idea of shape, e.g. one of a globe, in virtue of an unnoticed judgement made on the basis of a two-dimensional shape delivered at the first stage. This second stage explains why we ordinarily believe that visual perception can be as of a three-dimensional shape.

For Locke, visual experience at the first passive stage is not changed by judgement at the second stage. Unnoticed judgement is made on the basis of what 'truly is variety of shadow or colour' to yield an idea of a solid shape 'when the idea we receive … is only a plain variously coloured'. When the mind actively 'alters' an idea of a circle, passively received, to an idea of a globe, for example, it does not thereby cease receiving that which is altered; it continues to receive an idea of a circle. Moreover, in Locke's view, there is a sense in which we do not 'truly' see a globe with a uniform colour, but 'truly' see a circle with different shades of colour. Perceptual experience at the passive stage is taken not only to remain the same, but also to remain 'truly' perceptual. Locke's explanation of judgement would clarify what he intends to say.

> [Judgement], in many cases, by a settled habit, in things whereof we have frequent experience, is performed so constantly, and so quick, that we take that for the perception of our sensation, which is an idea formed by our judgement; so that one, *viz*. that of sensation, serves only to excite the other, and is scarce taken notice of itself; as a man who reads or hears with attention and understanding, takes little notice of the characters, or sounds, but of the ideas, that are excited in him by them.[7]

[7] Locke (1997), II, ix, 9, p. 145.

One might be misled into believing that shapes as perceived by sight can be three-dimensional, for judgement is made constantly and quickly. However, the ideas of solid shapes obtained thus are the results of judgement, but not of perception itself. We 'truly' see flat shapes in the sense that perception as such delivers two-dimensional shapes, although constant and quick judgement makes it difficult to notice them. The idea here is that judgement is not part of, or does not constitute, 'perception' in the strict sense of the word. Passive perception is self-contained, and is independent of active judgement. Locke makes a sharp distinction between the passive, perceptual stage and the active, judgemental stage.

Locke's answer to Molyneux's Question is in part a consequence of the above account. The question provides him with a case where ideas received by perception are not changed by judgement. For only the stage of passive perception is available to Molyneux's subject, who has not acquired the ability to make an unnoticed judgement on the basis of perception. After the passage quoted above, he goes on to write as follows:

> To which purpose I shall here insert a problem of … Mr. Molineux … ; and it is this: 'Suppose a man born blind, and now adult, and taught by his touch to distinguish between a cube, and a sphere of the same metal, and nighly of the same bigness, so as to tell, when he felt one and t'other, which is the cube, which the sphere. Suppose then the cube and sphere placed on a table, and the blind man to be made to see: Quaere, whether by his sight, before he touched them, he could now distinguish, and tell, which is the globe, which the cube.' To which the acute and judicious proposer answers: 'Not. For though he has obtained the experience of, how a globe, how a cube affects his touch; yet he has not yet attained the experience, that what affects his touch so or so, must affect his sight so or so: or that a protuberant angle in the cube, that pressed his hand unequally,

> shall appear to his eye, as it does in the cube.' I agree with this thinking gent. whom I am proud to call my friend, in his answer to this his problem; and am of opinion, that the blind man, at first sight, would not be able with certainty to say, which was the globe, which the cube, whist he only saw them; though he could unerringly name them by his touch, and certainly distinguish them by the difference of their figures felt.[8]

Molyneux answers his own question negatively, his reason being that a newly sighted man would not know how the shapes he has felt by touch would affect sight. Locke approves Molyneux's negative answer because Locke, too, believes that how shapes affect sight differs from how they affect touch. The difference, for Locke, is such that the shapes as visually experienced are two-dimensional whereas shapes as tactilely experienced are three-dimensional. The newly sighted man, having a cube and a globe in front of him, would not have experience as of a cube and a globe, but have experience as of a polygonal shape and a circular shape. On the other hand, the newly sighted man would have had tactile experiences as of a cube, globe, and other three-dimensional shapes. In the case of touch, the mind need not learn to actively obtain an idea of a three-dimensional shape; the mind passively receives an idea of a solid shape from tactile perception. Locke, after arguing that an idea received by visual perception can be altered by an unnoticed judgement, writes: 'But this is not, I think, usual in any of our ideas, but those received by *sight* …'.[9] In his view, it does not usually happen that an idea passively received by touch (and by other non-visual senses) is altered by unnoticed activity of the mind. This strongly suggests that, for Locke, we can passively receive ideas of three-dimensional shapes through tactile perception. If he had thought that the mind makes a judgement whenever we touch a

[8] Ibid., II, ix, 8, p. 144.
[9] Ibid., II, ix, 9, pp. 144-5.

three-dimensional shape, he would have stated that the altering of ideas by judgement is common not only in the case of sight but in the case of touch. Locke's view is that three-dimensional shapes can be passively delivered by touch.[10] Thus, in Locke's view, shapes as visually perceived are two-dimensional, whereas those as tactilely perceived are three-dimensional. This phenomenological difference between visual and tactile shape experiences is one of Locke's reasons for delivering a negative answer to Molyneux's Question.

One might think as follows: visual perception delivering only plane shapes would be a sufficient obstacle for Molyneux's subject whose task is to name the solid shapes placed before him, so Locke's view of tactile shape perception is irrelevant to his negative answer. However, I think that it is relevant. If Locke's view was that we need to judge solid shapes on the basis of tactile perception, it might follow that Molyneux's man, through tactile experiences, has learned to judge three-dimensional shapes by two-dimensional shapes delivered by perception. Then there might be room for arguing that it would be possible for Molyneux's subject to judge solid shapes by the two plane shapes delivered by sight. Such an argument is prevented by Locke's argument from the phenomenological difference between two-dimensional visual experience and three-dimensional tactile experience.

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[10] This interpretation would also be supported by Locke's view that 'simple ideas' are 'the materials of all our knowledge', and are delivered to the mind only by '*sensation* and *reflection*' (ibid., II, ii, 2, p. 121). He explains that simple ideas we obtain from 'reflection' are the ideas of 'perception' and 'will', which pertain to what the mind does rather than what are particularly provided by its performance. Thus, ideas of three-dimensional shapes must be provided by the other source of simple ideas, i.e. 'sensation'. Because the sense of sight is not a channel for receiving simple ideas of solid shapes, Locke would be left with the other modality capable of delivering simple ideas of shapes, i.e. the sense of touch. (We will discuss Locke's simple ideas of shapes later in this chapter.)

Besides the phenomenological view, there is an empiricist view that grounds Locke's negative answer. According to Locke, we need to acquire the ability to make an unnoticed judgement which, based on a flat shape delivered by sight, yields an idea of a solid shape. If this ability was inborn, it would enable the newly sighted man, having visual perception as of flat shapes, to make a judgement to obtain ideas of a cube and a globe. Locke's implicit denial of this possibility is presumably due to his empiricism. Locke, as an empiricist, denies that we have any inborn capacity to relate a particular idea of a two-dimensional shape to a particular idea of a three-dimensional shape.

To understand Locke's phenomenological view more precisely, let us clarify four distinctions that are involved in Locke's negative answer to Molyneux's Question. It is also important for our purpose of understanding his phenomenological account. The first two distinctions are the distinction between the *passive* and the *active* stages of experience, and that between the stage of *perception* and the stage of *judgement*. Locke conflates these two distinctions; he regards the passive stage as pertaining to perception, and the active stage as pertaining to judgement. This conflation is not self-evident, but is rather an assumption Locke makes. As we saw, Locke does not think that passive perception is affected by an active judgement. But it might be possible to suppose that perception is changed by an activity of the mind. Although the two distinctions might not exactly correspond to each other, Locke supposes that they do.

The third distinction is that between *inborn* and *acquired* abilities for obtaining ideas. Locke superimposes this distinction on the first two distinctions. In his view, we have the *inborn* capacity to *passively* receive ideas by *perception*, whereas we need to *acquire* the ability to *actively* alter ideas by *judgement*. Locke particularly denies that we have the inborn capacity to make an active judgment. However, it is not contradictory to suppose that the inborn-acquired distinction does not necessarily correspond to the passive-active or the perceptual-judgemental distinctions. Locke is committed to the view that the former must coincide with the latter two.

The fourth distinction, which concerns visual perception, is between *two-dimensionality* and *three-dimensionality*. Locke also superimposes this distinction on the other distinctions. That is, passive visual perception that we have from birth delivers two-dimensional shapes, whereas active judgement that we learn to make yields ideas of three-dimensional shapes. The plane-solid distinction, however, is also independent of the other distinctions. It is possible that passive visual perception we have from birth delivers solid shapes, and that active judgement we learn to make produces ideas of plane shapes. The superimposition here is another point committed to by Locke.

Now, which of the four distinctions are relevant to Locke's phenomenology of shape? It is the combination of the perceptual-judgemental distinction and the plane-solid distinction that entails Locke's phenomenological view of visual shape perception. Visual perception delivers two-dimensional shapes, while the mind judges by them three-dimensional shapes. Visual perception is not affected by such a judgement, because perception is completely independent of judgement. Thus the resulting thesis is that the shapes as visually perceived are all two-dimensional.

The other two distinctions are not necessary for this phenomenological thesis. First, the passive-active distinction is not necessary for the phenomenological thesis. The thesis is compatible with both the view that perception is entirely passive, and the view that it is changed by the mind's activity. One could disagree with Locke by saying that perception can be affected by some activity of the mind, but could agree with the thesis that visual perception is always two-dimensional. For example, one might think that the two-dimensionality of visual perception is a result of some mental activity, or that there is a mental activity that changes perception without changing its two-dimensionality. But one could still hold that the shapes as visually experienced are two-dimensional, and that the mind judges three-dimensional shapes based on them. Second, the inborn-acquired distinction is also not required for Locke's phenomenological thesis. One could hold, for example, that the ability to have visual shape experience is not inborn, and needs to be acquired through training of the eyes. But one could still hold that visual shape perception, once acquired, delivers two-dimensional shapes. Or one could hold, contrary to Locke's account, that the ability to judge three-dimensional shapes based on two-dimensional visual perception is inborn. Clearly this claim endorses Locke's phenomenological thesis that shapes as visually perceived are two-dimensional.

Thus, Locke's phenomenological view of visual shape perception can be considered independently of what ability he thinks is passive or active, and of what ability he thinks is inborn or acquired. The same would be true of his phenomenological view of tactile shape perception. As we saw, Locke thinks that tactile experience delivers three-dimensional shapes. This phenomenological view as such can be understood independently of an account as to whether there is any active element in three-dimensional tactile perception, or whether the ability to have three-dimensional tactile perception is inborn or acquired. Thus, we can draw the following phenomenological theses from Locke's answer to Molyneux's Question:

(L*v*) The shapes as visually perceived are two-dimensional.

(L*t*) The shapes as tactilely perceived are two- or three-dimensional.

It is because of (L*v*) that Locke needs to explain why we ordinarily take visual experience to be three-dimensional. His account is that we judge a solid shape by the colours of the plane shape delivered by visual perception. On Locke's account, the shapes as visually perceived are two-dimensional, and some mental process makes the subject take them to be three-dimensional (without actually changing them).

In what follows, I will reject two rival interpretations of Locke's account of visual experience of shape. They are both incompatible with my interpretation that Locke holds the phenomenological thesis (L*v*). On one alternative interpretation, Locke thinks that we have no visual shape perception at all prior to judgement – i.e. that we do not even have visual perception as of two-dimensional shapes. I will reject this interpretation by criticising Bolton's and Evans' defence of the interpretation. On another interpretation, Locke holds that we have visual perception as of three-dimensional shapes, rather than only visual perception as of two-dimensional shapes. I will argue against Berchielli, an advocator of this interpretation.

2. Bolton's and Evans' interpretation

According to Bolton and Evans, Locke's view is that visual experience delivers only light and colours, but no shape at all. Bolton refers to several passages (including parts of the first passage I quoted) in which Locke maintains that we learn to obtain ideas of shapes by making judgements. My interpretation is that such judgments are based on visual experience as of two-dimensional shapes with light and colours, yielding ideas of three-dimensional shapes. Bolton's interpretation, in contrast, is that judgments are based only on light and colours, producing ideas of two-dimensional as well as three-dimensional shapes. For example, when Locke writes, in the passage I quoted, that 'the *ideas we receive by sensation, are often* in grown people *altered by the judgement*', what he means by 'the *ideas we receive by sensation*', according to Bolton, are only ideas of light and colours.[11]

However, as I quoted earlier, the above sentence is followed by this remark: 'When we set before our eyes a round globe, of any uniform colour, *v.g*. gold, alabaster, or jet, 'tis certain, that the idea thereby imprinted in our mind, is of a flat circle variously shadowed …'. Here Locke holds that we obtain an idea of a plane shape when having a solid shape in front of us. Does this not sufficiently clarify Locke's thought that objects as passively seen have two-dimensional shapes? Bolton anticipates this question, and responds to it by insisting that judgement would be required not only for obtaining an idea of a solid shape, such as one of a globe, but for obtaining an idea of a plane shape. Her reason is as follows. Seeing that a surface is flat entails seeing that its parts are arranged in a peculiar way in three-dimensional space. For example, seeing that a surface is flat and circular entails seeing that its parts are arranged differently in three-dimensional space from parts of a spherical surface. So, a subject, having a flat object before the eyes, need to make a judgement to the effect that the shades of colour he sees are characteristic of a flat object.[12] This response seems to me insufficient. It might be true that, on Locke's account, a circular shape passively delivered by visual perception can have shades of colour peculiar to a case of there being something flat in the environment. It might also be true that, on his account, we would, by making a judgement, have an idea of *a flat circle uniformly coloured* when the shape as passively seen is a flat circle with different shades of colour. Yet there is still room for him to claim that the idea we

[11] Bolton (1994), p. 80.
[12] Ibid., p. 81.

would have *without judgement* is an idea of *a flat circle with various shades of colour*. That is, Locke could allow that a judgement based on light and colour does not necessarily alter the idea *with respect to shape*. In the case of a subject having a circle before the eyes, the idea she obtains would be one of a circle regardless of whether she makes a judgement. The underlying thought here would be that the shape as visually perceived is the same as a two-dimensional projection of the shape existing before the eyes. The reason why visual perception is as of a circle when there is a globe before the subject would be that a circle is a projection of a globe on a plane surface. Thus, Locke could claim, if a circle is placed before us such that it is viewed head-on, the shape as visually perceived would be circular. He need not admit that a judgement is required for that perception.

Bolton also anticipates the above objection, and criticises it as talking of retinal images rather than ideas. According to her, two-dimensional projections are retinal images, whereas what Locke deals with are not retinal images but the *ideas* produced by them.[13] This criticism, I think, also falls short. For, clearly, Locke could still hold that the *ideas* produced by retinal images are those of two-dimensional shapes. I see no reason why he should suppose that ideas thus produced have nothing to do with shape.

Bolton refers to Locke's claim in the *Elements of Natural Philosophy* that seeing a shape is tantamount to seeing the edges of colour. Does this claim imply that no shape is delivered by visual perception? The following is how Locke puts the claim:

[13] Ibid.

> Besides colour, we are supposed to see figure; but in truth, that which we perceive when we see figure, as perceivable by sight, is nothing but the termination of colour.[14]

In my view, this remark does not show that Locke excludes shape as what is passively delivered by visual perception. If seeing shape is seeing the 'termination of colour', it follows that we see shape whenever we see colour and its boundaries. Indeed, Locke does characterise figure as 'perceivable by sight'. His point seems to me to be that we do not have shape experience 'besides', or in addition to, colour experience, the reason being that seeing the former is already entailed by the latter.

Bolton also appeals to Locke's claim that to see shape is to see the boundaries of colour to suggest a non-literal or non-spatial reading of the phrase 'flat circle' in a passage we saw.[15] Locke, as we saw, writes that when there is a globe in front of the eyes, an idea of a 'flat circle' is 'imprinted' in the mind. Bolton acknowledges that the process by which we obtain an idea of a flat circle, on Locke's account, is a causal or passive one which involves no judgement. But she insists that the idea thus 'imprinted' in the mind would not be that of a flat circle in the literal or spatial sense. She writes as follows:

> It seems he was struggling to describe a pattern of light and colour that has no reference to figures in two- or three-dimensional space. As he put it elsewhere, the 'circularity' pertains, not to a surface, but to the 'termination of colours'; and we can suppose that the idea is 'flat' in that it specifies nothing about spatial relations among parts of a surface.[16]

Bolton stresses that seeing shape, for Locke, is no more than seeing the 'termination of colour'. I do not see why this claim suggests that Locke uses the expression a 'flat

[14] Locke (1750), p. 39.
[15] Locke (1997), pp. 81-2.
[16] Ibid.

circle' in a non-literal or non-spatial way. For example, if a blue object delivered by visual perception has a contour, and if Locke called the contour circular, it would be possible, and I think plausible, to regard him as literally talking of the shape of the blue object as experienced by sight.

Evans adopts the same interpretation as Bolton's in a footnote of his paper 'Molyneux's Question'.[17] He appeals to the following passage from Locke's *Essay*:

> … sight, the most comprehensive of all our senses, conveying to our minds the ideas of light and colours, which are peculiar only to that sense; and also the far different ideas of space, figure, and motion, the several varieties whereof change the appearances of its proper object, *viz*. light and colours, we bring ourselves by use, to judge of the one by the other.[18]

What Locke says here does imply that we judge shape by light and colours. However, this is compatible with my interpretation that the mind judges a three-dimensional shape based on perception as of a flat shape with light and colours, rather than merely on experience of light and colours. Locke says that without a judgement, we, having a globe in front of us, in fact receive an idea of 'a flat circle variously shadowed, with several degrees of light and brightness coming to our eyes'. He also describes what we receive without a judgement as 'a plain variously coloured'. On Locke's account, the mind learns to judge a three-dimensional shape by shades of colour. Such learning enables us to have 'the perception of a convex figure, and an uniform colour'. So, when he says that we judge the object's shape by light and colours, he could be interpreted as holding that we judge a 'convex' or three-dimensional shape (having a 'uniform colour') on the basis a 'flat' or two-

[17] Evans (1985), p. 355, footnote 5.
[18] Locke (1997), II, ix, 9, p. 145.

dimensional shape that is 'variously shadowed, with several degrees of light and brightness coming to our eyes', or 'a plain variously coloured'. Evans italicises the above quotation in the following way:

> … sight, the most comprehensive of all our senses, conveying to our minds the ideas of light and colours, which are peculiar only to that sense; and also the far different ideas of space, figure, and motion, the several varieties whereof change the appearances of *its proper object*, *viz*. light and colours, we bring ourselves *by use*, to judge of the one by the other.

The idea that we 'use' light and colours to judge a solid shape is compatible with the view that visual perception delivers two-dimensional shapes with light and colours; Locke could hold that light and colours of flat shapes are 'used' to judge three-dimensional shapes. Furthermore, Locke's characterisation of light and colours as 'proper object' of sight would be compatible with regarding shape as an object of sight. What he means is that light and colours are objects *peculiar to* sight. He could hold that shape is not peculiar to sight because it is delivered not only by visual perception but by tactile perception.

Bolton and Evans fail to give good evidence for their interpretation. Let us now look at evidence that disproves their interpretation – i.e. evidence for taking Locke as thinking that we do have visual shape perception even before a judgement. I agree with Ralph Schumacher's objection to Bolton's interpretation.[19] Locke writes in the chapter 'Of Simple Ideas of Diverse Senses':

> The ideas we get by more than one sense, are of *space,* or *extension, figure*, *rest*, and *motion*: for these make perceivable impressions, both on the eyes and touch: and we can

[19] Schumacher (2003).

> receive and convey into our minds the ideas of the extension, figure, motion, and rest of bodies, both by seeing and feeling.[20]

Locke includes figure as one of the 'simple ideas' we receive by both sight and touch. 'Simple ideas' are ideas received *passively*.

> These *simple* ideas, when offered to the mind, *the understanding* can no more refuse to have, nor alter, when they are imprinted, nor blot them out, and make new ones itself, than a mirror can refuse, alter, or obliterate the images or ideas, which, the objects set before it, do therein produce.[21]

If simple ideas are given only passively, and if the ideas of shapes are among them, it clearly follows that ideas of shapes are received passively. Locke's view, then, is that we passively receive ideas of shapes by both sight and touch. This is not compatible with the interpretation that judgement must (actively) 'alter' ideas of light and colours in order for us to obtain ideas of shapes at all. The fact that Locke regards the ideas of shapes as simple ideas received by sight and touch shows that he takes them to be ideas received from visual and tactile perception before judgement. This in turn implies that there is passive shape perception through both sight and touch.[22]

Let us consider the following question: if Locke did justice to his claim that shape is not delivered by visual perception *in addition to* colour, the shapes as seen being no more than the edges of colour, would he allow that we receive from visual experience an idea of shape *in addition to* an idea of colour? I think that the answer is 'yes'. This is how Locke describes the way the mind receives more than one simple idea at a time:

[20] Locke (1997), II, v, p. 128.
[21] Ibid., II, i, 25, p. 121. See also ibid., II, xii, 1, p. 159; II, xxx, 3, p. 335.
[22] Schumacher (2003), pp. 54-5.

> … though the sight and touch often take in from the same object, at the same time, different ideas; as a man sees at once motion and colour; the hand feels softness and warmth in the same piece of wax: yet the simple ideas thus united in the same subject, are as perfectly distinct, as those that come in by different senses.[23]

Locke, concerning sight, uses an example of seeing motion and colour at the same time. We may have perception as of a white object moving in a straight line. In this case, it is not only that visual perception delivers the motion and colour at the same time, but that visual perception delivering the motion entails its delivering the colour. The visual perception does not deliver the white colour in addition to the straight motion, but rather its delivering the motion already involves its delivering the colour. Nevertheless, Locke would say that the idea of the colour and the idea of the motion, though 'united in the same subject', are 'perfectly distinct'.[24] This consideration can be readily applied to the case of seeing shape and colour. In Locke's view, visual perception delivering shape is nothing but its delivering the boundaries of colour. The outcome is not only that visual perception delivers shape and colour at the same time, but that visual perception delivering colour (and its edges) entails or involves its delivering shape. But Locke would still maintain that an idea of shape and an idea of colour are simple ideas distinct from each other. He, denying that we see shape in addition to colour, would say that we receive an idea of shape in addition to an idea of colour.

[23] Locke (1997), II, ii, 1, p. 121.
[24] For Locke, an idea of colour, as well as one of motion, is a simple idea. See ibid., II, iii, 1, p. 123.

3. Berchielli's interpretation

Let us now turn to the second alternative interpretation, according to which Locke thinks that three-dimensional shapes are delivered by visual perception in a passive manner. Let us first deny that Berchielli gives proper evidence, and then argue against her interpretation.

Berchielli begins with drawing our attention to Locke's remark that sight is 'the most comprehensive of all senses'.[25] Locke's reason for this claim, according to Berchielli, is that sight 'has access to figures that the sense of touch cannot reach'.[26] Berchielli holds that Locke thus gives primacy to sight. She regards this as Locke's 'first step' towards the view that we passively have visual experience as of three-dimensional shapes.[27] I will not argue against this point, because Berchielli would admit that Locke's endorsement of the comprehensiveness of sight does not serve as sufficient evidence for his taking visual experience as three-dimensional, being only the 'first step'.

Berchielli's substantial evidence rests on what Locke says concerning the idea of *space*. The outline of her argument is as follows. Locke defines shape as a 'mode' of the simple idea of space. The simple idea of space, according to Locke, is received by both sight and touch. He regards the simple idea of space as an idea of three-dimensional space. Therefore, an idea of shape, which is a 'mode' of the simple idea of space, should be an idea of three-dimensional shape, whether it is perceived by sight or touch. Let us closely look at this argument in what follows.

[25] Ibid., II, ix, 9, p. 145.
[26] Berchielli (2002), p. 54.
[27] Ibid., p. 55.

Locke discusses 'modifications' of one simple idea, or 'simple modes', in Book II, xiii.[28] The mind passively receives a simple idea. According to Locke, the mind, by repeating a single simple idea, can obtain further ideas, which 'the mind either finds in things existing, or is able to make within itself'.[29] He, as we have seen, takes space as one of the simple ideas received by both sight and touch. One of his examples of simple modes of the idea of space is the idea of figure. Locke writes:

> There is another modification of this idea [of space], which is nothing but the relation which the parts of the termination of extension, or circumscribed space have amongst themselves. This the touch discovers in sensible bodies, whose extremities come within our reach; and the eye takes both from bodies and colours, whose boundaries are within its view: where observing how the extremities terminate either in straight lines, which meet at discernible angles; or in crooked lines, wherein no angles can be perceived, by considering these as they relate to one another, in all parts of the extremities of any body or space, it has that idea we call *figure*, which affords to the mind infinite variety. For besides the vast number of different figures, that do really exist in the coherent masses of matter, the stock that the mind has in its power, by varying the idea of space; and thereby making still new compositions, by repeating its own ideas, and joining them as it pleases, is perfectly inexhaustible: And so it can multiply figures *in infinitum*.[30]

One of the modifications of the simple idea of space is the idea of figure. The mind discovers the relation among the parts of the termination of perceived extension – i.e. the relation among the parts such as straight lines and curved lines. The mind thus 'finds in things existing' their shapes. If the mind finds three straight lines being the boundaries of extension, for example, it thereby has the idea of a triangle.

[28] Locke (1997), II, xiii, 1, p. 162.
[29] Ibid.
[30] Locke (1997), II, xiii, 5, p. 163.

Furthermore, the mind, through repeating such parts as straight lines and curved lines, can 'make within itself' the ideas of infinitely many shapes. Berchielli construes that Locke, in the above passage, gives the definition of shape – i.e. the definition of shape as a mode of space.[31]

Berchielli, then, turns to the ideas of 'distance' and 'capacity', of which Locke writes as follows:

> This space considered barely in length between any two beings, without considering anything else between them is called *distance*: if considered in length, breadth, and thickness, I think, it may be called *capacity* … .[32]

'Distance', which is one-dimensional, and 'capacity', which is three-dimensional, are kinds of the idea of space. (This discussion is followed by a section in which Locke claims that the ideas of different distances, such as an inch, foot, yard, etc., are different modifications of the idea of space, or the idea of distance.[33]) Berchielli stresses that the idea of space, for Locke, can be that of 'capacity', which has three dimensions.[34] If the simple idea of space can thus be considered in a three-dimensional way, then it follows that the simple idea of space given to sight (as well as to touch) is that of three-dimensional space. Since an idea of shape is defined as a modification of this idea of space, an idea of shape would be that of three-dimensional shape.

I disagree with Berchielli's interpretation that Locke is *defining* shape when he holds that an idea of shape is one of the modes of the idea of space. For modes are classified by Locke as *complex* ideas, which the mind actively frames by using as

[31] Berchielli (2002), p. 55.
[32] Locke (1997), II, xiii, 3, p. 162.
[33] Ibid., II, xiii, 4, p. 162.
[34] Berchielli (2002), pp. 55-6.

materials simple ideas received passively.[35] Thus, when Locke says that the mind obtains an idea of shape by 'observing' the termination of extension and 'considering' the relation of its parts, or by repeating the idea of space, the mind is thought to be engaged in an *activity* of forming a complex idea. In other words, when Locke holds that an idea of shape *qua* a modification of the idea of space is 'nothing but the relation which the parts of the termination of extension … have amongst themselves', he is explaining an idea of shape *qua* a complex idea, which is an idea of shape *qua* an idea of a relation among lines. In contrast, we saw that Locke includes an idea of shape among simple ideas received passively.[36] A simple idea of shape received either by sight or by touch is obviously not a modification of space, or the idea of space actively formed as a relation among lines. There are two ways in which the mind can have an idea of shape; one way is to passively receive it by sight or touch, and the other way is to actively form it as a mode of the idea of space. Therefore, Berchielli is wrong in construing Locke as defining an idea of shape as a mode of the idea of space. Rather, he is talking of one of the two ways in which the mind can have an idea of shape.

Berchielli might insist that linking an idea of shape to the idea of space is not necessary for her interpretation. Locke says that the idea of space is received by sight, and also that the idea of space can be the idea of capacity, which has three dimensions. Would it not follow from this that our visual perception is as of three-dimensional space? I think not. Locke only holds that space considered in terms of one dimension is 'distance' whereas space considered in terms of three dimensions is 'capacity'. He does not say that the idea of space received by sight and that received

[35] Locke (1997), II, xii, 1, p. 159; II, xii, 3, p. 160. Locke classifies complex ideas into three kinds, which are 'modes', 'substances' and 'relations'.

[36] Ibid., II, v, p. 128.

by touch can both be considered in terms of three dimensions. He could claim that the idea of space received by sight does not allow us to have the idea of capacity, whereas the idea of space received by touch does.

According to Berchielli's interpretation, Locke takes three-dimensional shapes to be delivered by sight in a passive manner. I have shown that her evidence fails to support her interpretation. She also reconstructs Locke's view on *how* three-dimensional shapes are delivered by visual experience, admitting that Locke is not explicit on this matter. I would now like to reject her reconstruction of that view. According to Berchielli, Locke thinks that visual experience as of a three-dimensional shape is a temporal process – that it is a process that takes time. For example, if we are shown a cube only instantaneously, the idea we receive without judgement would be an idea of a two-dimensional shape (such as a hexagon). But if we are allowed to look at a cube from many points of view, the cube rotating in front of our eyes, or us moving around the cube, we would be able to have an idea of a cube even without a judgement. Visual experience as of a three-dimensional shape, thus, is possible if there is time for the subject or the object to move in relation to the other.[37]

Berchielli goes on to insist that Locke would therefore give a positive answer to Molyneux's Question if he considered a case where Molyneux's subject is allowed to look at the cube and the globe from many points of view. The reason is that Molyneux's subject, under this condition, could have visual perception as of three-dimensional shapes, even though he has not learned to make a judgement to obtain ideas of three-dimensional shapes. It would be that Molyneux's subject could have visual experience as of a cube and a globe in a passive way. According to Berchielli,

[37] Berchielli (2002), pp. 57-9.

Locke gives a negative answer because his supposition is that there is no movement of the subject or the objects. If there is no movement, Molyneux's subject could only receive ideas of two-dimensional shapes.[38]

Berchielli says: 'In my model, the material impressions of sight in Locke are not (instantaneous) retinal images, but rather a succession of images'.[39] Receiving an idea of shape through sight is a temporal process because an idea of shape results from 'a succession of images'. However, if an instantaneous image as visually experienced is two-dimensional, how could a succession of images be three-dimensional? It seems to me that some mental activity would be required for a series of flat images delivered to the mind to produce an idea of a solid shape. I do not mean that the mind would need to be active in order to obtain a single idea through temporally extended experience; there might be no need for the mind to actively collect a series of images delivered by sight. (Indeed, Locke allows that there is a simple idea of motion, the possession of which would require unity of successive instantaneous experiences.) Nor do I simply assume that the mind would have to be active in order to obtain an idea of a three-dimensional shape; it is possible that solid shapes are passively delivered by visual perception. My point is as follows: if, as Berchielli says, Locke's view is that an instantaneous visual perception can only deliver a two-dimensional shape, then that view would be incompatible with the account that a three-dimensional shape is delivered by visual perception in a passive manner in cases where a solid object is viewed from many angles. If Berchielli were right, it would follow from Locke's view that we passively see three-dimensionally when, say, a cube rotates in front of the eyes. However, even on her interpretation, if

[38] Ibid., pp. 62-4.
[39] Ibid., p. 58.

an instantaneous experience is isolated from the temporal succession of visual experiences, it would be as of a two-dimensional shape. For example, on Berchielli's interpretation, visual perception I have by looking at a cube from obliquely above would be as of a three-dimensional shape if the perception is part of the temporal succession, whereas perception I have by looking at a cube from precisely the same angle would be two-dimensional if it is not part of the succession, i.e. in a case where there is no movement. That is, the objective (or physical) state of affairs at one moment, i.e. the objective (or physical) relation between the object and my eyes obtaining at one moment, would not determine whether the shape as visually perceived at that moment is two- or three-dimensional. The implication would be that there is some contribution by the subject that explains the spatial dimensionality of the shape as seen at the instant in question. Berchielli does not provide a coherent interpretation in insisting that the mind, for Locke, could passively have visual experience as of a three-dimensional shape in cases where the object or the subject moves.

Indeed, Berchielli takes Locke's remark on 'observing' and 'considering', which I have quoted above, as a clue to understand Locke's inexplicit view as to how we see three-dimensionally. According to Berchielli, Locke thinks that we have visual experience as of three-dimensional shapes by 'observing' a temporal series of boundaries of colour and 'considering' the relation among them. Berchielli takes this process to be passive.[40] However, as we saw, an idea we obtain as a result of 'observing' and 'considering' is, for Locke, a complex idea; it is a 'mode', which is formed actively.[41] Therefore, we have to construe the processes of 'observing' and

[40] Ibid., p. 58.
[41] Whereas simple ideas are received passively, complex ideas are formed actively.

'considering' as active ones through which the mind frames a complex idea of shape. 'Observing' and 'considering' are irrelevant to Locke's view on what ideas the mind receives by perception prior to a judgement or other mental activity. So, from Locke's remark on 'observing' and 'considering', Berchielli could not draw the account that we have experience as of a three-dimensional shape in a passive manner.

4. The homogeneity of two-dimensional shapes across sight and touch

When Locke says that a simple idea of shape is received by both sight and touch, he means that a simple idea of a two-dimensional shape is received through both senses. A simple idea of a triangle, for example, is received by both sight and touch. That is, a triangular shape delivered by sight, for example, is the same as a triangular shape delivered by touch. Mackie is right in claiming that Locke would give a positive answer to a two-dimensional version of Molyneux's Question. It is a version of Molyneux's Question with a square and a circle, which was introduced by Diderot.[42] It follows from Locke's view that a newly sighted man, shown a square and a circle, would be able to have visual experience as of a square and a circle. Moreover, a square and a circle delivered by sight are the same as a square and a circle delivered by touch. Molyneux's subject would receive simple ideas with which he is already familiar because of tactile perception. Then the subject would correctly say that the shapes put before him are a square and a circle.[43] Evans objects to

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Locke writes as follows in the first section of the chapter on complex ideas: '… as the mind is wholly passive in the reception of all its simple ideas, so it exerts several acts of its own, whereby out of its simple ideas, as the materials and foundations of the rest, the other are framed' (Locke (1997), II, xii, 1, p. 159).

[42] Mackie (1976), pp. 30-1; Diderot (1977), p. 55.

[43] In the original case of Molyneux's Question, the newly sighed subject would have visual perception as of a polygonal shape and a circle. It follows from Locke's view that the two shapes delivered by sight are the same as a polygonal shape and a circle

Mackie by insisting that Locke allows no visual perception of shape at all.[44] On Evans' interpretation of Locke, a newly sighted man would not even have visual perception as of a square and a circle. Evans thus denies that Locke would have given a positive answer to Diderot's two-dimensional version of Molyneux's Question. Having rejected Evans' and Bolton's interpretation, we can support Mackie's claim.

Notice that a positive answer to Diderot's version of the question would not contradict Locke's motivation for discussing the question. Locke discusses Molyneux's Question in order to illustrate that an unnoticed judgement alters ideas received by sight, but not to argue that visual shape experience and tactile shape experience are heterogeneous from the first-person viewpoint. (As we will see, it is Berkeley's motivation to argue for the latter thesis.) If Locke's motivation was to propose the latter thesis, it might be coherent for him to give a negative answer even to Diderot's version of the question. But since his purpose is to illustrate the former view, it would cause him no problem to allow that plane shapes delivered by sight (on the basis of which judgements could be made) are the same as those delivered by touch. From the above considerations, we can conclude that the following phenomenological thesis is held by Locke:

(L*vt*) There is no difference between two-dimensional shapes delivered by sight and two-dimensional shapes delivered by touch.

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delivered by touch. So, if Locke is right, Molyneux's subject might incorrectly say that the shapes placed before him are a polygonal shape (say, a hexagon) and a circle.

[44] Evans (1985), p. 355, footnote 5.

Mackie and Michael Ayers respond to a possible objection to Locke's negative answer.[45] I would like to discuss this objection, because a correct response to it given by Mackie and Ayers would support my attribution of (L*vt*) to Locke. Whereas Locke defines an 'idea' as 'whatsoever the mind perceives in itself, or is the immediate object of perception, thought, or understanding', he defines a 'quality' as 'the power to produce any idea in our mind'.[46] 'Qualities' in the external world are the causes of 'ideas' in the mind. Locke, then, classifies qualities into 'primary' and 'secondary' qualities. 'Primary qualities', on the one hand, are such qualities as 'solidity, extension, figure, motion, or rest, and number', which external objects must have.[47] Examples of 'secondary qualities', on the other hand, are 'colours, sounds, tastes, *etc*.', which are dependent on primary qualities.[48] For example, according to Locke, the secondary quality of colour is a power of insensible primary qualities, i.e. a power of insensible particles which, having certain primary qualities, hit our eyes to produce an idea of colour.[49] Now, one essential difference between 'primary' and 'secondary' qualities is in that ideas of primary qualities *resemble* the external objects, whereas ideas of secondary qualities do not.[50] He asserts that 'the *ideas of primary qualities* of bodies, *are resemblances* of them, and their patterns do really exist in the bodies themselves'.[51] Locke, including shape as a primary quality, thinks that an idea of shape the mind receives resembles the shape of the object causing the idea. One might then insist that Locke should give a positive answer to Molyneux's Question. Locke would acknowledge that the ideas of a cube and a

[45] Mackie (1976), pp. 28-32; Ayers (1991), Vol. I, pp. 65-6.
[46] Locke (1997), II, viii, 8, p. 134.
[47] Ibid., II, viii, 9, p. 135.
[48] Ibid., II, viii, 10, p. 135.
[49] Ibid., II, viii, 13, p. 136; II, viii, 23, p. 139.
[50] Ibid., II, viii, 15, pp. 136-7.
[51] Ibid., II, viii, 15, p. 136. See also ibid., II, viii, 17, p. 137.

globe Molyneux's subject has received by touch resemble cubical and global objects in the external world, respectively. Locke, one might claim, should also acknowledge that the ideas of a cube and a globe Molyneux's subject receives by sight when he begins to see, too, resemble the cube and the globe in the environment, respectively. The outcome would be that the ideas Molyneux's subject receives by sight resemble ideas of a cube and a globe he has received by touch, because both pairs of ideas resemble the same qualities, i.e. a cube and globe, in the external world. The idea is that two things resembling the same thing should resemble each other. Thus, it might be claimed, Locke should give a positive answer to Molyneux's Question.

Indeed, one of Bolton's motivations for her interpretation is to respond to the above objection. According to her, Locke would deny that there is any visual shape perception at all. If so, it would plainly follow that no ideas Molyneux's subject receives by sight would resemble any idea of shape he has received by touch. Locke would then be able to justify his negative answer despite his view of the resemblance between primary qualities and ideas of them. We have rejected Bolton's interpretation, so we can say that this response is incorrect. The response suggested by Mackie and Ayers should be adopted. The response is made by interpreting Locke in the way we have. Locke answers Molyneux's Question negatively because he thinks that Molyneux's subject would have visual experience as of two plane shapes. Suppose that his visual experience is as of a hexagon and a circle. He would receive ideas of a hexagon and a circle, which resemble a hexagon and a circle (rather than a cube and a globe) existing in the external world. Thus, the ideas Molyneux's subject receives by sight would not resemble the same external shapes as do the ideas of a cube and a globe he would have received by touch. Rather, the ideas he receives by sight would resemble the same external shapes as do the ideas of a hexagon and a circle he would have received by touch.

The above criticism of the possible objection to Locke would reinforce my interpretation of drawing (L*vt*) from Locke's account. We receive ideas of plane shapes by sight. They resemble the plane shapes in the environment. Ideas of plane shapes received by touch, too, resemble the plane shapes in the environment. Thus, if the resemblance here is transitive, ideas of plane shapes received by sight would resemble ideas of plane shapes received by touch. That is, plane shapes delivered by visual perception would resemble plane shapes delivered by tactile perception.

5. Conclusion

Through considering how Locke answers Molyneux's Question, and how he would answer the two-dimensional version of it, I have clarified Locke's phenomenological view as to shape perception. Locke holds (L*v*) that the objects as seen are two-dimensional, although he holds (L*t*) that the objects as felt are two- or three-dimensional. He also holds (L*vt*) that there is no difference between two-dimensional shapes delivered by sight and two-dimensional shapes delivered by touch. I take Locke to simply provide descriptions of the visual and tactile phenomenology without giving reasons.

Holding (L*v*) and (L*t*), Locke would affirm the claim (C1) that the description of the objects as felt mentions both flat and solid shapes, and the claim (C2) that the description of the objects as seen mentions no solid shape. The thesis (L*vt*), concerning two-dimensional shapes delivered by visual and tactile perceptions, would not serve to block the step from (C1) and (C2) to (C3), that the description of the objects as felt and that of the objects as seen cannot both be a description of the physical objects around us. For the claim (C3) is drawn from the point that visual and tactile perceptions do not both deliver three-dimensional shapes. Hence, Locke's phenomenological view supports the argument for (C5).

Chapter 2:

Berkeley

Berkeley considers Molyneux's Question in his *Essay towards a New Theory of Vision* (hereafter *NTV*), delivering a negative answer. His negative answer is given in the course of his argument which runs throughout *NTV* – the argument that there is *nothing at all* that is delivered by both visual and tactile perceptions. In Berkeley's view, visual perception and tactile perception are entirely different, such that, from the subjective point of view, they have nothing in common with each other. Berkeley begins the book with the account that there is no *numerically* identical object delivered by both visual and tactile perceptions – i.e. that what is delivered by visual perception and what is delivered by tactile perception must be numerically distinct. This account consists of three claims. The first is that distance, or depth, is not delivered by visual perception, the second is that a size delivered by visual perception only has a habitual and contingent connection to a size delivered by tactile perception, and the third is that the upper and lower directions delivered by visual perception are only contingently and habitually related to those delivered by tactile perception. He then goes on to commence arguing for the view that things delivered by visual perception and things delivered by tactile perception are different *in kind*. (We shall call this view the 'general heterogeneity view'.) This argument is divided into two parts. In the first part, Berkeley argues for the view that visual perception and tactile perception deliver different kinds of extension and shape. This is where Berkeley discusses Molyneux's Question. In the second part, which is rather short, he argues that visual perception and tactile perception deliver different kinds of motion.

Among the above arguments, I will concentrate on Berkeley's heterogeneity view of extension and shape – the view that extension and shape delivered by visual perception and those delivered by tactile perception are different in kind. For my purpose is to clarify Berkeley's phenomenological account of shape, or, more precisely, his heterogeneity view as to the visual and tactile phenomenology of shape. As we will see, Berkeley's discussion on which I focus presupposes many points he makes in earlier sections of the book, so we will also need to look at the relevant discussions included in the part where he argues for the numerical difference between objects delivered by visual perception and those delivered by tactile perception.

Berkeley's heterogeneity view of extension and shape constitutes (a large part of) his general heterogeneity view. Now, whereas the general heterogeneity view is phenomenological, concerning what it is like for us to have visual and tactile experiences, it is linked with his empiricist doctrine. The empiricist view is that the interrelationship between visual and tactile experiences, which we take for granted in everyday life, is in fact only habitual and contingent. My exposition of Berkeley's phenomenology, for the purpose of clarification, will incorporate his empiricist explanations. However, after the exposition, I will understand his phenomenological view independently of his empiricist account.

For my exposition, I will use Berkeley's terms such as a 'visible object', 'tangible object', 'visible figure', 'tangible figure', 'visible square', 'tangible square', etc. The general heterogeneity view is that visible objects and tangible objects differ in kind. The heterogeneity view regarding extension and shape is that visible extension and shape, on the one hand, and tangible extension and shape, on the other hand, are different in kind. Berkeley would claim that the existence of visible objects, visible figures, and so on are mind-dependent. It is not clear from what he writes in *NTV* whether he thinks that the existence of tangible objects, tangible shapes, etc. are mind-dependent or mind-independent.[52] However, at any rate, Berkeley's position as to whether what he calls visible or tangible objects, shapes, etc. are mind-dependent or mind-independent would not affect my discussion. What is relevant to us is the phenomenological description of them that he gives in explaining the heterogeneity between 'visible extension' and 'tangible extension', or that between 'visible figures' and 'tangible figures'. Thus, in so far as my exposition of Berkeley's phenomenology of shape is concerned, these terms are interchangeable with my terms such as the 'objects as seen', 'shapes delivered by tactile perception', and other terms I introduced in Introduction.

Some more terminological clarification is needed. In Berkeley's terminology, an 'idea' means the object of perception or thought. He writes that 'when I speak of tangible ideas, I take the word idea for any the immediate object of sense, or understanding, in which large signification it is commonly used by the moderns'.[53]

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[52] Berkeley even calls a tangible extension 'real extension' (*NTV*, § 74, p. 47). His view in *NTV* might be not only that tactile perception is as of a mind-independent object, but that the object of tactile perception is mind-independent. (The former thesis is that the object of tactile experience seems to the subject as though it is mind-independent, and is independent of the latter thesis. For example, the former thesis is compatible with the denial of the latter thesis – that is, it is compatible with the idea that the object is mind-dependent despite the way it seems to the subject.) Pitcher (1977) even interprets Berkeley's account of tactile experience to be direct realist (p. 58). However, according to Turbayne (1955), 'Berkeley was a convinced immaterialist' before he wrote *NTV* (p. 339). It would follow from immaterialism that no object of perception could be mind-independent, there existing no such object in the first place. It seems difficult to say whether Berkeley in *NTV* takes the object of touch as mind-dependent or as mind-independent.

[53] *NTV*, § 45, p. 33.

So, in my exposition concerning Berkeley's account of visual and tactile perception, I will interpret 'ideas' to be objects delivered by visual or tactile perception, which are, in Berkeley's terms visible or tangible objects. Berkeley also has a significant distinction between 'mediate and immediate objects of sight'.[54] He writes that 'when the mind perceives any *idea*, not immediately and of itself, it must be by means of some other *idea'*.[55] Berkeley gives an analogy with another's emotions and countenance. He says that although another's shame or fear is invisible, we see it by means of the red or blue colour of another's face.[56] I take Berkeley to mean that when there is an 'immediate object' of sight, there is something it is like to visually perceive that very object, just as there is something it is like to see the colour of a face. In contrast, there is nothing it is like to see a 'mediate object' itself, just as there is nothing it is like to see someone's emotion. A 'mediate object' is nevertheless given to the mind, because it is 'suggested' by an 'immediate object'. Thus, what is relevant to Berkeley's phenomenological view is his description of 'immediate' visible or tangible objects, as opposed to 'mediate' or 'suggested' ones.

One question might arise at this point as to what Berkeley means by the difference between visible and tangible objects in 'kind'. What criterion does Berkeley use to classify them into kinds? Margaret D. Wilson and George Pitcher raise this question. Wilson, on the one hand, interprets the criterion as resting on the notion of resemblance. If so, Berkeley holds visible objects and tangible objects to be different in kind *because* he denies the resemblance between them. Wilson's criticism of Berkeley seems to be that the notion of resemblance falls short of providing Berkeley with a clear notion of 'kind' which he thinks is available for his

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[54] Ibid., § 74, p. 46.
[55] Ibid., § 9, p. 15.
[56] Ibid., § 9, p. 15.

inquiry. Pitcher, on the other hand, does not scrutinise what Berkeley means by the sameness or difference in kind. Rather, he says that Berkeley's 'answer and defence may be regarded as showing what sense he attaches to the tricky phrase "of the same kind", and anyway it ought to tell us what thesis, exactly, it is that he holds concerning the relationship between visible extension (figure, motion) and tangible extension (figure, motion)'.[57] My exposition will be conducted with the same attitude as Pitcher's. Clarifying Berkeley's specific points and arguments, I will take them to be constitutive of his heterogeneity view of extension and shape.

Berkeley provides three arguments for the heterogeneity view as to extension and shape. Before he begins the first argument, he makes two preliminary points. One is a criticism of Locke's notion of 'abstract ideas'. He rejects the thought that ideas abstracted from particular visible and tangible extension or shape are common to sight and touch.[58] We will not go into the details of this point, for it does not bear on Berkeley's view of the way visible and tangible objects are in themselves. The other preliminary point is that distance (or depth) is not delivered by visual perception, but is delivered by tactile perception. I will discuss this point since it can be regarded as a phenomenological argument for the heterogeneity view of extension and shape. Thus, I will expound one preliminary point and three arguments. I will then summarise Berkeley's heterogeneity view regarding shape, clarifying the set of phenomenological theses to which he is committed. We will see that Berkeley's phenomenological theses support the argument for (C5), because he thinks that the shapes as seen are unstable and are neither flat nor solid, whereas the shapes as felt are stable and are flat or solid.

[57] Pitcher (1977), p. 51.
[58] NTV, §§ 122-5, pp. 69-70.

1. The argument from the absence of distance in visual perception

The following is the way Berkeley puts one of the preliminary points:

> Some, perhaps, may think pure space, vacuum, or trine dimension to be equally the object of sight and touch: but though we have a very great propension, to think the ideas of outness and space to be the immediate object of sight; yet if I mistake not, in the foregoing parts of this essay, that hath been clearly demonstrated to be a mere delusion, arising from the quick and sudden suggestion of fancy, which so closely connects the idea of distance with those of sight, that we are apt to think it is itself a proper and immediate object of that sense, till reason corrects the mistake.[59]

In the above passage, Berkeley says that he has disproved that 'pure space' or three-dimensionality is the 'immediate object' of sight. He is referring to an earlier part of *NTV* in which he argues that an object delivered by visual perception and an object delivered by tactile perception must be numerically distinct. In this earlier part, he insists that distance (i.e. distance from the subject, or depth) is not delivered by visual perception.[60] We can find four reasons he gives for this thesis.

The first reason draws on physiological knowledge of our visual system.

> It is, I think, agreed by all, that *distance* of itself, and immediately, cannot be seen. For *distance* being a line directed end-wise to the eye, it projects only one point in the fund of the eye. Which point remains invariably the same, whether the distance be longer or shorter.[61]

Because the back of the eye, or the retina, has a two-dimensional surface, a point projected onto it is the same whether it is a projection of a point far from the

[59] *NTV*, § 126, p. 71.
[60] Ibid., § 2, p. 13.
[61] Ibid., § 2, p. 13.

perceiver or a projection of a point close to the perceiver. Since distance itself is not projected onto the back of the eye, the subject does not see it.

The second reason is based on introspection. Berkeley rejects two accounts that appeal to knowledge of optics. One account is that we see distance in virtue of the angle formed by the two optic axes. Since we have two eyes, there are two optic axes, or two straight lines that pass through the centres of the crystalline lenses. The account is as follows: we can see something at a nearer distance in virtue of the angle formed by the two optic axes being larger, and we can see something at a further distance in virtue of the angle in question being smaller.[62] The other account Berkeley rejects is that we see distance in virtue of the degree of 'divergency' of light rays entering the pupil. The idea is that light rays entering the pupil are more parallel to each other when the object emitting or reflecting them is further, whereas they are less parallel to each other when the object emitting or reflecting them is nearer. On this account, we can judge distance by the degree of the spreading of light rays reaching the eye.[63] Berkeley rejects those two explanations by writing as follows:

> But those *lines* and *angles*, by means whereof *mathematicians* pretend to explain the perception of distance, are themselves not at all perceived, nor are they, in truth, ever thought of by those unskilful in optics. … Every one is himself the best judge of what he perceives, and what not. In vain shall all the mathematicians in the world tell me, that I perceive certain lines and angles which introduce into my mind the various ideas of distance; so long as I myself am conscious of no such thing.[64]

[62] Ibid., § 5, p. 14.
[63] Ibid., § 6, p. 14.
[64] Ibid., § 12, pp. 15-6. See also ibid., § 19, p. 17.

Do we see the angle formed by the two optic axes, or the paths of light rays between the object and the pupil? Because '[e]very one is himself the best judge of what he perceives, and what not', he can deny, solely on the basis of introspection, that such things are delivered to the mind by visual perception. This conclusion from introspection seems to rest on his belief that, in introspection, we do not encounter lines, or distances, between the objects and the eyes. Indeed, he straightforwardly asserts: 'I know evidently that distance is not perceived of itself'.[65] Thus, we can construe the second reason to consist in the thought that we do not come across distance in introspection.

The third reason appeals to the thought that *colour* does not exist outside the mind. He holds that 'colours, which are the proper and immediate object of sight, are not without the mind'.[66] Colour is genuinely delivered by visual perception. However, colour is something that exists only inside the mind. Therefore, what is delivered by visual perception exists only within the mind. There is no object of sight that exists outside the mind and is located at some distance from the subject. Berkeley anticipates the objection that sight delivers not only colour but extension, shape and motion, which his opponent would say are without the mind and are located at a distance. Berkeley's response is that extension and colour delivered by visual perception are both located at precisely the same place. Then, because colour is inside the mind, extension delivered by visual perception also has to be inside the mind.[67] Berkeley goes on to claim that shape and motion delivered by visual

[65] Ibid., § 18, p. 17.
[66] Ibid., § 43, p. 31.
[67] Ibid. Berkeley also says that visible extension and its colour are inseparable even in thought. However, Berkeley's argument here is insufficient, for the point that extension and its colour are located at the same place is compatible with the conclusion that they are both at a distance.

perception have to be at the same location as extension delivered by visual perception, whose position coincides with colour, and therefore that shape and motion delivered by visual perception also have to be inside the mind.

The fourth reason is based on the fact that things change the way they look when we move. We ordinarily believe that the moon is seen at a certain distance. However, Berkeley claims, the moon as we see it is not an object located at a distance. The moon as seen from the earth, he says, is a flat, round object. If it is true that we see this flat, round object at a distance, we should be able to come close to it. But this is impossible. If I kept moving closer to the moon, the flat, round object would gradually change, and would eventually become something completely different from the flat, round object. According to Berkeley, when we ordinarily believe that we move closer to an object we see, something 'obscure, small, and faint' changes into something 'clear, large, and vigorous'.[68] I think that Pitcher's interpretation of this argument is clear and correct. An object existing at a distance should not be something that changes simply because of our movement towards it. However, a visible object does undergo change when we think that we approach it; it becomes clearer, larger, and more vigorous. Therefore, an object delivered by visual perception cannot be an object located at a distance.[69] Berkeley would also hold that when we seem to move further from a visible object, the object becomes 'obscure, small, and faint', and so that it cannot be something located at a distance.

It is for the above four reasons that Berkeley thinks that there is no visual perception as of an object located at a distance. He thinks that distance is delivered

[68] Ibid., § 44, p. 32.
[69] Pitcher (1977), pp. 26-7.

by tactile perception. For him, the 'idea' of distance is an 'idea' perceived and acquired through tactile experience.

> … having of a long time experienced certain ideas, perceivable by touch, as distance, tangible figure, and solidity, to have been connected with certain ideas of sight, I do, upon perceiving these ideas of sight, forthwith conclude what tangible ideas are, by the wonted ordinary course of nature, like to follow. … I believe whoever will look narrowly into his own thoughts, and examine what he means by saying, he sees this or that thing at a distance, will agree with me, that what he sees only suggests to his understanding, that after having passed a certain distance, to be measured by the motion of his body, which is perceivable by touch, he shall come to perceive such and such tangible ideas which have been usually connected with such and such visible ideas.[70]

Berkeley thinks that the idea of distance enters the mind through tactile experience, because he takes distance to be 'measured' by experience of movement of the body, which Berkeley classifies as tactile. If I take one step forward, for example, I have (tactile) experience of movement through a certain distance. It is such tactile experience of distance that visual experience is connected to. For example, if I have visual perception as of a chair, my experience is not as of an object located at a distance. However, the visual experience allows me to understand that if I feel my body move forward about a meter, I will have a tactile sensation on my leg. Visual perception, though involving no experience of distance, is connected to tactile experience such that the former 'suggests' the latter. Visual experience 'suggests' an experience of bodily movement followed by a tactile sensation on the body.[71]

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[70] *NTV*, § 45, pp. 32-3.

[71] In *Principles of Human Knowledge*, Berkeley writes that 'the ideas of sight, when we apprehend by them distance and things placed at a distance, do not suggest or mark out to us things actually existing at a distance, but only admonish us what ideas

Berkeley holds that the connection between visual experience and the tactile idea of distance is established by repeated experiences – that it is a habitual connection. We will not go into the details of Berkeley's explanation of how the connection is made, and which particular sensations involved in seeing are linked to the tactile idea of distance. What is important for us is the conclusion that there is no distance, or depth, in visual perception.

> … a man born blind, being made to see, would, at first, have no idea of distance by sight; the sun and stars, the remotest objects as well as the nearer, would all seem to be in his eye, or rather in his mind. The objects intromitted by sight, would seem to him (as in truth they are) no other than a new set of thoughts or sensations, each whereof is as near to him, as the perceptions of pain or pleasure, or the most inward passions of his soul. For our judging object perceived by sight to be at any distance, or without the mind, is … entirely the effect of experience, which one in those circumstances could not yet have attained to.[72]

For a man who begins to see for the first time, visual experience is not yet connected to tactile experience, because he has not established a habitual link between them. So, visual experience does not 'suggest' to him any tactile experience. This means that he would not be prone to the 'delusion' of visual distance, which is caused by the

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of touch will be imprinted in our minds at such and such distances of time, and in consequence of such and such actions' (Berkeley (1996b), § 44, p. 42). In *Three Dialogues between Hylas and Philonous*, he writes as follows concerning the idea of distance: 'From the ideas you actually perceive by sight, you have by experience learned to collect what other ideas you will … be affected with, after such a certain succession of time and motion' (Berkeley (1996c), p. 141). What Berkeley writes in *Principles of Human Knowledge* and *Three Dialogues between Hylas and Philonous* might suggest that, in his view, the idea of distance consists not only in experience of bodily movement, but in experience of time passage. If so, that distance is 'measured' by bodily movement would mean that the idea of distance is acquired through experience of bodily movement accompanied by experience of time passage.

[72] *NTV*, § 41, pp. 30-1.

habitual connection of visual perception to tactile perception. In this sense, he knows what visual perception is really like when an object it delivers seems to be 'in his mind'. Thus, according to the preliminary point Berkeley makes, extension and shape delivered by visual perception and those delivered by tactile perception differ in kind, in that visual perception does not deliver extension or shape located at a distance, whereas tactile experience does.

2. The argument from subjective classification

Let us turn to Berkeley's first argument for his heterogeneity view of extension and shape. He writes:

> When, upon perception of an idea, I range it under this or that sort; it is because it is perceived after the same manner, or because it has a likeness or conformity with, or affects me in the same way as the ideas of the sort I rank it under. In short, it must not be entirely new, but have something in it old, and already perceived by me: it must, I say, have so much at least, in common with the ideas I have before known and named, as to make me give it the same name with them. But it has been, if I mistake not, clearly made out, that a man born blind would not, at first reception of his sight, think the things he saw were of the same nature with the objects of touch, or had anything in common with them; but that they were a new set of ideas, perceived in a new manner, and entirely different from all he had ever perceived before: so that he would not call them by the same name, nor repute them to be of the same sort, with any thing he had hitherto known.[73]

According to Berkeley, an object delivered by perception would be of the same kind as other objects which were delivered by perception in the past, if they all have so

[73] Ibid., § 128, p. 72.

much in common as to be called by the same name by the subject. Then the question is: can any object delivered by visual perception be called by the same name as any object delivered by tactile perception? Berkeley does not trust a normal subject's classification, because for a normal subject, visual experiences already have habitual and contingent connections with tactile experiences. Berkeley would say that the classification would not be free of a 'delusion'. That is why Berkeley is concerned with the case of a newly sighted subject.

As Berkeley says in the above quote, he has argued in earlier sections for the claim that a newly sighted person could name *nothing at all* by sight. Since this claim is a blanket one regarding anything that could be delivered by perception, the argument has various points. The points include those as to habitual and contingent connections between visual and tactile experiences with respect to upper and lower directions, size, shape, and number.[74] The argument also draws on the point that only light and colours are delivered by visual perception.[75] Berkeley repeats this last point as his third argument for the thesis that visual perception and tactile perception deliver different kinds of extension and shape, so I will discuss it in the next section. Here, for my purpose, I would like to consider Berkeley's point on shape that he develops in earlier sections. (Berkeley does not specify which earlier points are relevant to the later argument concerning the kinds of extension and shape delivered by visual perception and by tactile perception. This, I think, is because his claim that a newly sighted subject would classify nothing delivered by visual perception as the same as anything delivered by tactile perception is so strong as to entail that a newly

[74] Ibid., §§ 92-106, pp. 56-72.
[75] Ibid., § 103, p. 60.

sighted subject would classify no extension or shape delivered by visual perception as the same as that delivered by tactile perception.)

We need to begin by looking at Berkeley's point on *size*, since his conclusion on shape perception is drawn from his conclusion on size perception. Discussing size perception, Berkeley refers back to even earlier sections, where he argues that a size delivered by visual perception has no necessary connection with a particular size delivered by tactile perception. First, he argues for the possibility that visual size experience has no connection at all with tactile size experience. He imagines a possibility that visual perception could only deliver objects smaller than the smallest possible object that tactile perception could deliver. Then no size delivered by visual perception could be related to any size delivered by tactile perception. Berkeley regards this possibility as showing that the connection between visual size experience and tactile size experience is merely contingent.[76] Second, he argues that 'the greater visible magnitudes might have been connected with, and introduced into our minds lesser tangible magnitudes, and the lesser visible magnitudes greater tangible magnitudes'.[77] We might ordinarily believe that a larger object delivered by visual perception has a necessary relation to a larger object delivered by tactile perception, and smaller object delivered by visual perception is necessarily related to a smaller object delivered by tactile perception. For example, when we have visual experience as of something large, we expect tactile experience as of a large object. However, Berkeley insists, such a relation is a mere contingent one established by habit. For example, when the mind is given a large object through sight, it is often also given a large object through touch. It is because we have had many such

[76] Ibid., § 62, p. 40.
[77] Ibid., § 63, p. 40.

experiences that a large size delivered by visual perception has come to 'suggest' to the mind a large size delivered by tactile perception. Had our normal experiences been different, such that, for example, visual perception as of a large object was often followed by tactile perception as of a small object, the former would have come to make us expect the latter. Berkeley writes that this is not a mere possibility, but is what we actually experience. For example, a distinct large object delivered by visual perception seems smaller to the subject than a faint small object delivered by visual perception, for the former is habitually connected with a smaller size delivered by tactile perception than the latter.[78] The connection of a size delivered by visual perception to a particular size delivered by tactile perception is not necessary.

From the above argument on size perception, Berkeley draws the following conclusion as to shape perception:

> … figure is the termination of magnitude, whence it follows, that no visible magnitude, having in its own nature an aptness to suggest any one particular tangible magnitude, so neither can any visible figure be inseparably connected with its corresponding tangible

[78] According to Berkeley's account, there is such a case because what participate in 'suggesting' tactile experience of size are not only visual size experience, but visual 'confusion or distinctness' and visual 'vigorousness or faintness' (ibid., § 56, p. 37). In addition, Berkeley writes: 'the judgments we make of greatness do … depend on the disposition of the eye; also on the figure, number, and situation of objects, and other circumstances that have been observed to attend great or small tangible magnitudes' (ibid., § 57, p. 37). Berkeley also thinks that visual perception as of an object located at a higher position 'suggests' a smaller tactile size than visual perception as of an object located at a lower position (ibid., § 63, p. 40; § 73, pp. 44-5). The point is that various kinds of experiences could be habitually connected with tactile size experience, depending on what experiences we frequently have simultaneously with tactile size experience, so a particular size delivered by visual perception, in combination with other experiences, could 'suggest' more than one size delivered by tactile perception.

> feature: so as of itself and in a way prior to experience, it might suggest it to the understanding.[79]

Any connection between a size delivered by visual perception and a size delivered by tactile perception is habitual and contingent. Because a shape is an outline of a size, the same is true of shape perception; any connection between an outline of a size delivered by visual perception and an outline of a size delivered by tactile perception is habitual and contingent. Then a newly sighted man would classify no shape delivered by visual perception as the same as any particular shape that has been delivered by tactile perception. This subjective classification, for Berkeley, implies a difference in kind between shapes delivered by visual perception and shapes delivered by tactile perception.

Let us make further clarification by considering the following objection. One might point out a leap in the above reasoning. Suppose it is true that, as Berkeley holds, a size delivered by visual perception could be connected, by habit, with none or any of the sizes delivered by tactile perception. Suppose it is also true that 'figure is the termination of magnitude', and so that a shape delivered by visual or tactile perception is a contour of a size delivered by visual or tactile perception. It might follow that a newly sighted person, before further experiences, would not classify a size delivered by visual perception as the same as any size that have been delivered by tactile perception before. However, it might be objected, this would not eliminate the possibility that a newly sighted subject might be able to classify a shape delivered by visual perception as the same as some shape that has been delivered by tactile perception. For, generally, classification of shape does not require classification of size. We can understand that the outlines of two things are both

[79] Ibid., § 105, p. 61.

triangular, for example, without asking what the relation between their sizes is. In so far as there are two or more things with extension, their contours could be classified as the same shape, and the relations between their sizes would be irrelevant to the classification. Then, it might be claimed, even if a newly sighted person could not make a cross-modal classification of sizes, he might be able to make a cross-modal classification of shapes, or of the contours of sizes.

I think that Berkeley would respond to the above objection by explicating the second of the arguments regarding size experience that we have discussed – i.e. the argument that a size delivered by visual perception only has a habitual and contingent connection with a particular size delivered by tactile perception. In this argument, he holds that a size delivered by visual perception is actually connected with more than one size delivered by tactile perception. That, he thinks, is because sizes delivered by visual perception are changeable whereas those delivered by tactile perception are stable.

> The magnitude of the object which exists without the mind, and is at a distance, continues always invariably the same: but the visible object still changing as you approach to, or recede from the tangible object, it hath no fixed and determinate greatness. Whenever therefore we speak of the magnitude of any thing, for instance a tree or a house, we must mean the tangible magnitude; otherwise there can be nothing steady and free from ambiguity spoken of it.[80]

For example, when I hold a book in a bookshelf with my hand and move forward, the size of the object delivered by visual perception becomes larger. If I step backward, the size becomes smaller. In contrast, the size of the object delivered by

[80] Ibid., § 55, pp. 36-7.

tactile perception remains unchanged throughout my movements. We have had such experience so often that a changing size delivered by visual perception has come to be connected with, and has come to 'suggest', a stable size delivered by tactile perception. Near the end of the *NTV*, Berkeley writes as follows:

> All that is properly perceived by the visive faculty amounts to no more than colours with their variations, and different proportion of light and shade: but the perpetual mutability and fleetingness of those immediate objects of sight, render them incapable of being managed after the manner of geometrical figures; nor is it in any degree useful that they should. It is true, there are divers of them perceived at once; and more of some, and less of others: but accurately to compute their magnitude, and assign precise determinate proportions, between things so variable and inconstant, if we suppose it possible to be done, must yet be a very trifling and insignificant labour.[81]

The changeability of sizes delivered by visual perception is such that those sizes could not serve the purpose of geometry. That is, we cannot rely on visual perception of size in order to study geometry. According to Berkeley, we cannot know the 'proportions' between sizes delivered by visual perception. For example, we believe that we see a square figure drawn on paper in studying the properties of the shape, but, in fact, the contour of the size delivered by visual perception does not have four equal parts. The proportion between the parts of the outline we call 'sides' constantly changes. (Berkeley would acknowledge that such change would result not only from the subject's movement forward or backward, but from movement to any direction.) So, that outline is not something that could be given a name of shape. (Berkeley goes as far as to say that diagrams a mathematician sees are 'not the figures, or even the

[81] Ibid., § 156, p. 84. See also ibid., § 151, p. 82.

likeness of the figures, which make the subject of the demonstration'.[82]) A shape delivered by visual perception only serves to 'suggest' certain tactile experience of shape in virtue of a habitual connection.[83] We believe that we see a figure with four equal sides, but that is because visual perception in such a case is habitually connected with an outline with four stably equal parts, which has been delivered by tactile perception. Thus, if a subject is made to see, he would not classify the shapes delivered by visual perception, which continuously undergo changes, as the same as shapes delivered by tactile perception, which are stable. Berkeley's conclusion would be that shapes delivered by visual perception and those delivered by tactile perception differ in kind. (Berkeley's thought that tactile perception delivers stable shapes presumably follows from his view that sizes delivered by tactile perception are constant. If a contour of a size delivered by tactile perception consists of parts whose sizes are constant, it follows that the size has a stable shape.)

Before we proceed, let us also look at Berkeley's point on *number* which he makes in arguing that a newly sighted man could name nothing at all by sight. The point is relevant to Berkeley's heterogeneity view of shape perception. Berkeley writes:

> … diversity of visible objects doth not necessarily infer diversity of tangible objects corresponding to them. A picture painted with great variety of colours affects the touch in one uniform manner; it is therefore evident, that I do not by any necessary consecution, independent of experience, judge of the number of things tangible, from the number of

[82] Ibid., § 150, p. 82.
[83] Ibid., § 152, pp. 82-3.

things visible. I should not therefore at first opening my eyes conclude, that because I see two I shall feel two.[84]

We ordinarily believe that when we have visual experience as of a certain number of things, we can expect tactile experience as of the same number of things. This, on Berkeley's account, is because of a habitual and contingent relation between visual and tactile perceptions. In fact, Berkeley thinks that there is no perception of number in the first place either through sight or through touch. He holds that number is 'entirely the creature of the mind'.[85] He says that the mind can combine two or more ideas in different ways, and regard any collection of ideas as a unit. For example, the mind can count a window as one, a chimney as one, a house which has windows and chimneys as one, or a city with many houses as one. He insists:

> Whatever therefore the mind considers as one, that is a unit. Every combination of ideas is considered as one thing by the mind, and in token thereof is marked by one name. Now, this naming and combining together of ideas is perfectly arbitrary, and done by the mind in such sort, as experience shows it to be most convenient: without which our ideas had never been collected into such sundry distinct combinations as they now are.[86]

Any collection of objects delivered by visual or tactile perception can be counted by the mind as one unit. The way the mind combines those objects varies with the purpose. Therefore, there is no number involved in visual or tactile perception as such.

Interestingly, Berkeley later develops an explanation which *prima facie* contradicts the explanation that we have just seen. He writes:

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[84] Ibid., § 108, p. 62.
[85] Ibid., § 109, p. 62.
[86] Ibid., § 109, pp. 62-3.

> … it must be acknowledged, the visible square, is fitter than the visible circle, to represent the tangible square, but then it is not because it is liker, or more of a species with it; but because the visible square contains in it several distinct parts, whereby to mark the several distinct, corresponding parts of a tangible square, whereas the tangible circle doth not. The square perceived by touch, hath four distinct, equal sides, so also hath it four distinct, equal angles. It is therefore necessary, that the visible figures which shall be most proper to mark it, contain four distinct, equal parts, corresponding to the four sides of a tangible square; as likewise four other distinct and equal parts, whereby do denote the four equal angles of the tangible square.[87]

Berkeley admits that a square shape delivered by visual perception has two sets of four equal parts, whereas a round shape delivered by visual perception has no such parts. (Berkeley would say that he is using the word 'equal' only in a rough sense here, for, as we have seen, he thinks that sizes delivered by visual perception have no steady proportions.) Berkeley also holds that a square shape delivered by tactile perception has four equal sides and four equal angles.[88] His explanation here implies that numbers, such as 'four', are delivered by visual and tactile perception. This seems incompatible with his earlier claim.

I think that the two seemingly incompatible explanations are reconcilable. Let us look at his claim that visible figures are 'ordained to signify' tangible figures 'by nature' or by 'the Author or nature'.[89] He writes:

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[87] Ibid., § 142, p. 78.

[88] Berkeley calls two sets of four equal parts of a square delivered by tactile perception 'sides' and 'angles', whereas he only holds that a square delivered by visual perception has two sets of four equal parts. This shows that Berkeley takes such parts as sides and angles to be delivered by tactile perception, but not by visual perception. He would say that the parts delivered by visual perception only serve to 'suggest' the parts 'sides' and 'angles' delivered by tactile perception.

[89] Ibid., § 140, p. 77. He also holds that 'the proper objects of vision constitute a universal language of the Author of nature, whereby we are instructed how to

> … because this language of nature does not vary in different ages or nations, hence it is, that in all times and places, visible figures are called by the same names as the respective tangible figures suggested by them … .[90]

The kind of shape that is delivered by visual perception and is called a 'square' is 'ordained' to be linked with the kind of shape that is delivered by tactile perception and is called a 'square'. The implication is that a square shape delivered by visual perception, which has two sets of four equal parts, is determined to be connected with a square shape delivered by tactile perception, which also has two sets of four equal parts. In this sense, the connection of the former to the latter is not arbitrary; it is determined by nature, or by God. Nevertheless, we still need to learn the connection by experience. One of the reasons would be precisely that the mind could take any collection of objects delivered by perception as one unit. So, for example, a newly sighted person would be unable to count the two sets of four parts of a square delivered by his new sense as we do. For he might count any combination of the parts as one. But if he goes on to learn the connection between visual and tactile perceptions, he would come to count the parts as we all do, or as determined by nature or by God.

Thus, there is a sense in which a visible square and a tangible square are homogeneous; they share the number of parts. However, this homogeneity is that which we arrive at through learning from experiences with the aid of nature, or with the benevolence of God, rather than that which is involved in perception. We learn to impose number, which is 'entirely the creature of the mind', on visual and tactile

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regulate our actions, in order to attain those things that are necessary to the preservation and well-being of our bodies, as also to avoid whatever may be hurtful and destructive of them' (ibid., § 147, p. 81).

[90] Ibid., § 140, p. 77.

experience. Berkeley would deny that his discussion of the number of the parts of visible and tangible squares supports any form of the homogeneity view of shape perception.

3. The argument from the features exclusive to each modality

The second argument for the heterogeneity view of extension and shape is as follows:

> … light and colours are allowed by all to constitute a sort of species entirely different from the ideas of touch: nor will any man, I presume, say they can make themselves perceived by that sense: but there is no other immediate object of sight besides light and colours. It is therefore a direct consequence, that there is no idea common to both senses.[91]

Berkeley thinks that only light and colours are delivered by visual perception. They can never be delivered by tactile perception. As I said, this point is included among the points relevant to the first argument. In an earlier section, he writes:

> That which I see is only variety of light and colours. That which I feel is hard or soft, hot or cold, rough or smooth.[92]

No feature is delivered by both visual and tactile perceptions. In other words, there are only features proper or exclusive to each sensory modality. It then follows that there is no extension or shape delivered by both visual and tactile perceptions.

Berkeley rejects a possible objection that not only light and colours but extension and shape are delivered by visual perception. In his view, to claim that

[91] Ibid., § 129, p. 72.
[92] Ibid., § 103, p. 60.

extension and shape can be delivered by visual perception in addition to light and colours is to claim that we can separate or abstract extension and shape from light and colours. He denies the possibility of such separation or abstraction. He insists that we cannot form in our mind extension or shape without any colour, or colour without any extension. The reason, he says, is that we 'see nothing but light and colours, with their several shades and variations'.[93] Berkeley is not denying that there is extension or shape delivered by visual perception. His point is that such extension or shape is inseparable from colour, and so cannot be delivered by tactile perception. The implication is that extension and shape delivered by visual perception cannot be of the same kind the same as those delivered by tactile perception.[94]

4. The argument from the impossibility to form a sum

Let us now look at the third argument. Berkeley takes it to be a universal truth that 'quantities of the same kind may be added together, and make one entire sum'.[95] According to his example, it is because a line, surface and solid cannot be added to each other that mathematicians regard them as three different kinds of quantity. Berkeley thinks that the same holds for visual quantity and tactile quantity. He claims that a line or surface delivered by visual perception and a line or surface delivered by tactile perception cannot be added together into one continuous line or surface in the mind. Therefore, according to Berkeley's universal truth, shapes

[93] Ibid., § 130, pp. 73.
[94] Ibid., § 130, pp. 72-3.
[95] Ibid., § 131, p. 73.

delivered by visual perception and shapes delivered by tactile perception are different in kind.[96]

5. A negative answer to Molyneux's Question

Berkeley's consideration of Molyneux's Question is followed by the above three arguments. In introducing Molyneux's Question, Berkeley says that a 'further confirmation of our tenet may be drawn from the solution of Mr. Molyneux's problem'.[97] By 'our tenet' Berkeley means the heterogeneity view of extension and shape, and by 'the solution' he means the negative answer given by Molyneux and supported by Locke. Berkeley employs their negative answer to support his view. However, he seems to think that their negative answer is insufficient. He argues as follows:

> Now, if a square surface perceived by touch be of the same sort with a square surface perceived by sight; it is certain the blind man here mentioned might know a square surface, as soon as he saw it: it is no more but introduced into his mind, by a new inlet, an idea he has been already well acquainted with. Since therefore he is supposed to have known by his touch, that a cube is a body terminated by square surfaces; upon the supposition that a visible and tangible square differ only *in numero*, it follows, that he might know, by the unerring mark of the square surfaces, which was the cube, and which not, while he only saw them. We must therefore allow, either that visible extension and figures are specifically distinct from tangible extension and figures, or else, that the solution of this problem, given by those two thoughtful and ingenious men, is wrong.[98]

As we saw in the last chapter, Locke thinks that visual experience is two-dimensional whereas tactile experience is three-dimensional. But he does not go so

[96] Ibid., § 131, pp. 73-4.
[97] Ibid., § 132, p. 74.
[98] Ibid., § 133, p. 74-5.

far as to deny that two-dimensional shapes are common to visual and tactile experiences. Berkeley seems to think that Locke's view would allow a positive answer to Molyneux's Question. If Molyneux's subject could notice that one of the two plane objects 'received' by sight consists of square surfaces, and if squareness is the same in both visual and tactile experiences, the subject might call it a cube, knowing by touch that a cube has square surfaces. This possible positive answer by Locke would need closer discussion or even qualification. Even if the plane shape in question ('received' by sight) has a square surface, it would not be constituted only by square surfaces; it might have trapeziums or parallelograms (being the same shape as a projection of a cube on a plane). It might then be that the subject would need the clue that one of the objects before him is cubical and the other is global. At any rate, Locke's negative answer would be open to discussion. (Indeed, as we saw, Locke's account would provide a positive answer to the two-dimensional version of Molyneux's Question.) For Berkeley, in contrast, there is no room for such a possible positive answer. For he would even deny the homogeneity of two-dimensional shapes across visual and tactile experiences. The last sentence in the above passage seems to mean that the negative answer given by Molyneux and Locke still needs to be defended by a more radical account.

Berkeley goes on to give his own argument for a negative answer. His argument can be construed as supplementing the negative answer given by Molyneux and Locke with his heterogeneity view of extension and shape, which is more radical than Locke's heterogeneity view of shape.

> I cannot let go the above-mentioned problem without some reflection on it. It hath been made evident, that a man blind from his birth, would not, at first sight, denominate any thing he saw, by the names he had been used to appropriate to ideas of touch … . Cube,

> sphere, table, are words he has known applied to things perceivable by touch, but to things perfectly intangible he never knew them applied. Those words, in their wonted application, always marked out to his mind bodies, or solid things which were perceived by the resistance they gave: but there is no solidity, no resistance or protrusion perceived by sight. In short, the ideas of sight are all new perceptions, to which there be no names annexed in his mind; he cannot therefore understand what is said to him concerning them: and to ask of the two bodies he saw placed on the table, which was the sphere, which the cube, were to him a question downright bantering and unintelligible; nothing he sees being able to suggest to his thoughts the idea of body, distance, or, in general, of any thing he had already known.[99]

The above answer consists of two of the arguments that we have seen. One is the first argument that a man who has recovered from blindness would classify nothing delivered by visual perception as the same as anything delivered by tactile perception. He claims that the man would not name anything a 'cube', 'sphere', or 'table' by sight. With respect to shape, this claim is based on the thought that sizes delivered by visual perception are only contingently and habitually connected with sizes delivered by tactile perception. The newly sighted man would be given two visible sizes. These two visible sizes would not yet be connected to any particular tangible sizes. Therefore, for the newly sighted man, the outlines of the two visible sizes would have no connection to outlines of any tangible sizes. That is why he would not name the two outlines a 'cube' and 'sphere', which are names he has given to outlines of sizes delivered by tactile perception. The other argument Berkeley employs in the above passage is the second argument we have discussed, which is to the effect that there is no feature delivered by both visual and tactile perceptions. The newly

[99] Ibid., § 135, p. 75.

sighted man has been given the shapes cube and sphere in virtue of tactile sensations of ‘resistance or protrusion’. But such sensations cannot be given through sight, for visual perception delivers only light and colours. Light and colours, which differ radically from ‘resistance or protrusion’, would not ‘suggest’ to the newly sighted subject such shapes as a cube and a sphere.

Thus, we can say that Berkeley gives a negative answer to Molyneux’s Question by employing the first and the second arguments for his heterogeneity view of extension and shape. Margaret Atherton regards Berkeley’s discussion of Molyneux’s Question as his fourth argument after the three we have discussed.[100] Atherton’s interpretation is as follows: Berkeley assents to Molyneux’s and Locke’s negative answer because their answer is that the newly sighted man could not name the two shapes delivered by visual perception, and so supports his general heterogeneity view. However, the argument for the general heterogeneity view which is based on the account that a newly sighted subject could not name shapes or anything else by sight has already been presented by Berkeley as his first argument. Atherton goes on to construe Berkeley’s own negative answer as confirming the point made by his agreeing to Locke’s and Molyneux’s negative answer. However, even in his own answer, Berkeley does not introduce the fourth argument; his answer consists of the first and the second arguments. Although Berkeley holds, in introducing Molyneux’s question, that a ‘further confirmation of our tenet may be drawn from the solution of Mr. Molyneux’s problem’, he does not provide a new argument. On my interpretation, Berkeley introduces Molyneux’s and Locke’s negative answer in order to defend it with his more radical account. His intention

[100] Atherton (1990), pp. 190-2.

seems to me to make the general heterogeneity view more appealing by providing a radical and cogent answer to Molyneux's Question.[101]

6. Berkeley's phenomenology of shape

We have seen Berkeley's arguments for his view that visual perception and tactile perception deliver different kinds of extension and shape. This view is a phenomenological one, for it concerns the way visual and tactile experiences are from the subjective viewpoint. Berkeley's account also incorporates the empiricist view that the connection between visual and tactile perceptions of shape is contingent, and is established through repeated experiences. For my purpose of dealing with the argument for (C5), let us summarise and organise Berkeley's arguments, concentrating on his phenomenological claims as to visual and tactile perception of shape.

According to Berkeley's preliminary point on distance, there is no experience of distance by sight. Among the four reasons for this point, the second one would be relevant to the phenomenology of shape.[102] The second reason is that we, in

[101] Wilson also regards Berkeley's discussion of Molyneux's Question as the fourth argument, saying that it merely appeals to the authority of Molyneux's and Locke's answer (Wilson (1999), pp. 267-8). Our interpretation would be that Berkeley is not completely satisfied with the authoritative answer, supplementing it with his radical view.

[102] The first and the third reasons can be taken to support the phenomenological claim here. The first reason is based on the fact that distance, or depth, is not projected on the retina. I, however, do not think that this reason would be strong enough to support the phenomenological claim. Even if knowledge of our visual system is relevant to the explanation of visual phenomenology, it might be that the brain, out of information from the retinas, can construct a space with three dimensions. The third reason is as follows: extension delivered by visual perception is precisely at the same location as colour, and since colour is inside the mind, extension delivered by visual perception also has to be inside the mind, not located at a distance. As a reason to support the phenomenological claim, this reason also does not seem sufficient. For the phenomenological question would be whether we have

introspection, never encounter lines or distances between the objects and the eyes. This reason is itself a phenomenological claim; Berkeley is giving a phenomenological description that depth is not included in the visual phenomenology. This description entails not only that objects as visually perceived are not located at depths, but that they do not have depth. Thus, on Berkeley's account, shapes as visually perceived are devoid of depth. It is important to notice that this, for Berkeley, does not mean that shapes delivered by visual perception are flat. If one says that they are flat, what one means is that they are 'smooth and uniform'.[103] However, smoothness and uniformity are not delivered by visual perception, but rather by tactile perception. Berkeley concludes:

> … planes are no more the immediate object of sight than solids. What we strictly see are not solids, nor yet planes variously coloured; they are only diversity of colours.[104]

Thus, from Berkeley's preliminary point regarding distance, we can obtain the following phenomenological thesis regarding visual shape perception:

(B*v*1) The shapes as visually perceived are neither flat nor solid.[105]

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experience as of colour located at a distance. For example, science might tell us that there is no colour in the world, and that there are, instead, our eyes and brains stimulated by a certain range of electromagnetic waves. But a question would remain as to whether colours are distributed in the external world *from the subjective viewpoint*. If the answer is that they are, it might follow that, in the visual phenomenology, extension is also located at a distance, sharing its location with a colour. The fourth reason draws on the observation that things change the way they look when we approach them. The idea is that, as Pitcher interprets it, an object which undergoes change because of our movement cannot be regarded as existing at a distance. From this fourth reason, we can draw a phenomenological account that an object as visually experienced changes in clarity, size, and vigorousness when the subject moves. Although this phenomenological account is not one of shape, I think that the thesis (B*v*2) below captures the same observation.

[103] NTV, § 157, p. 85.

[104] Ibid., § 158, p. 85. See also ibid., § 155, p. 84.

Distance, on Berkeley's account, is given to the mind through the experience of bodily movement, which is, for him, tactile. This account entails that tactile perception delivers shapes with depth. Depth is delivered by tactile perception, so, unlike in the case of sight, shapes that have depth can be delivered by tactile perception. With movement of a hand measuring lengths and distances, not only flat shapes but shapes with depth can be delivered by tactile perception.[106] Thus Berkeley's phenomenological thesis as to shapes as tactilely perceived would be:

(B*t*1) The shapes as tactilely perceived include both flat and solid shapes.[107]

As we saw in our discussion of the first argument, Berkeley thinks that shapes delivered by visual perception are so changeable that they cannot even be named, and that their changes are due to the subject's bodily movement. In contrast, he thinks that shapes delivered by tactile perception are stable.

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[105] Pitcher, from Berkeley's denial of depth perception by sight, draws the thesis that 'visual appearances are altogether flat' (Pitcher (1977), p. 8). Picher does this in his chapter on visual perception of distance, so perhaps he deliberately ignores Berkeley's claim as to the absence of 'smoothness and uniformity' from visual experience, which can be understood as independent of his argument for the absence of distance from visual experience. We take into consideration Berkeley's view that shapes as seen are not even flat, since our aim is to understand his phenomenology of shape as a whole.

[106] Berkeley would say that movement of the body or a part of the body measuring lengths and distances would be sufficient for the sense of touch delivering both flat shapes and shapes with depth. But he would not say that bodily movement is required for tactile shape perception, for he holds that 'tangible extension' is 'made up of several distinct co-existent parts' (*NTV*, § 145 p. 80). He would presumably acknowledge that shapes can be delivered by tactile perception not only through temporally extended experience of bodily movement, but through simultaneous experience as of distinct parts constituting a shape. (It is not clear, however, whether Berkeley would say that solid shapes as well as flat shapes can be delivered by simultaneous tactile perception. He might explain that flat shapes can be delivered simultaneously by tactile perception whereas bodily movement is required for tactile experience as of solid shapes.)

[107] I have used the phrases 'flat shapes' and 'shapes with depth' instead of the phrases 'two-dimensional shapes' and 'three-dimensional shapes' because Berkeley denies that numbers are delivered to the mind through perception.

(B*v*2) The shapes as visually perceived constantly change with bodily movement.

(B*t*2) The shapes as tactilely perceived are stable.

The second argument is that visual perception delivers only light and colours, whereas tactile perception delivers hardness, temperature, and smoothness. Since extension and shape delivered by visual perception are inseparable from light and colours, they can never be delivered by tactile perception. The idea here is that there are only features exclusive to each modality. So, Berkeley would also hold that extension and shape delivered by tactile perception are inseparable from hardness, temperature, and smoothness, and that they are therefore exclusive to the sense of touch.

(B*v*3) The shapes as visually perceived must accompany features proper to sight.

(B*t*3) The shapes as tactilely perceived must accompany features proper to touch.

The third argument is that, although it is universally true that quantities of the same kind can form a sum, extension and shape delivered by visual perception and those delivered by tactile perception cannot be added together. This argument might provide a phenomenological account of perception that a shape delivered by visual perception and a shape delivered by tactile perception cannot be located next to each other to form a combined shape, or one of imagination that we have no capacity of placing them next to each other in imagination. It, however, does not seem to offer us a phenomenological view as to those shapes themselves.

Thus, Berkeley's phenomenology of shape consists in the contrasts between (B*v*1) and (B*t*1), between (B*v*2) and (B*t*2), and between (B*v*3) and (B*t*3). Shapes as visually perceived are neither flat nor solid, changeable, and dependent on light and colours. Berkeley gives them an apt description when he writes that all that is delivered by visual perception is 'no more than colours with their variations, and different proportion of light and shade' whose characteristics are 'mutability and fleetingness'. In contrast, shapes as felt by touch are flat or solid, stable, and dependent on features such as hardness and temperature. On Berkeley's account, they are what we ordinarily mean by the word 'shape'.

Since Berkeley grounds his negative answer to Molyneux's Question on the first and the second arguments, we can say that his answer is based on the contrast between (B*v*2) and (B*t*2), and that between (B*v*3) and (B*t*3). I think that he could have appealed to the first contrast, arguing that the newly sighted man could not relate the shapes delivered by visual perception, which are neither flat nor solid, to any shapes that have been delivered by tactile perception, which are either flat or solid.

Berkeley's negative answer follows not only from the above phenomenological theses, but from his empiricist tenet. We do have the ability to relate visual shape experience to tactile shape experience. Berkeley's empiricist claim is that our mind has acquired that ability through repeated experiences. However, if the ability in question is inborn, Berkeley would have to admit, despite his heterogeneity view, that Molyneux's subject could relate the visual experience to tactile experience as of a cube and a globe (just as we could); he would not need to learn the relation between visual and tactile shape experiences. Thus, Berkeley's negative answer requires the empiricist claim that the connection between visual and tactile shape experiences is learned by experience. We will not go into further discussion on Berkeley's empiricist view, since our interest is in his phenomenology of shape. What is important for us is not the way visual and tactile shape perceptions are connected with each other in the mind, but the way each of them is from the subjective viewpoint. I will treat Berkeley's phenomenological theses independently of his empiricist explanation.

7. Conclusion

Among Berkeley's phenomenological views that lead him to (or could lead him to) a negative answer to Molyneux's Question, the views relevant to my inquiry are the pair of (B*v*1) and (B*t*1) and the pair of (B*v*2) and (B*t*2). (B*v*1) and (B*t*1) straightforwardly support (C1) and (C2), which, according to the argument for (C5), entail that a phenomenological description is of the mind-dependent objects. (B*v*2) and (B*t*2) would reinforce the argument for (C5). One who holds Berkeley's phenomenological theses might argue for (C5) in the following way. The description of the shapes as seen mentions changeable shapes which are neither flat nor solid, whereas the description of the shapes as felt mentions flat shapes and solid shapes which are stable. They cannot both be a description of the external objects. If we are to admit that either of the description is of the physical objects, it would be the description of the tactile phenomenology of shape mentioning stable shapes. Therefore, the description of the shapes as seen is not of the external objects. It is a description of the mind-dependent objects.

Thus, the threat of the argument for (C5) would be caused by Berkeley's phenomenological account that visual perception delivers no stable flat shape or stable solid shape. We have seen how Berkeley justifies this account. Among other claims, the phenomenological claim supporting the view that visual perception delivers no solid shape is that depth is not delivered by visual perception. The view that visual perception delivers no flat shape is concluded from the phenomenological description that smoothness and uniformity are not involved in the visual phenomenology. However, if Berkeley means by smoothness what we ordinarily mean by that word, I think it unconvincing that perception delivering smoothness is necessary for its delivering a flat shape. For a flat shape need not have a smooth surface. For example, its surface can be rough. What does Berkeley mean by uniformity? If it differs from what he means by smoothness, I think that he means equidistance of the parts of a surface from the subject. Berkeley's explanation of uniformity would presumably be as follows. If, on the one hand, perception delivers a surface whose parts are not all equidistant from the subject, the surface as perceived has concave or convex parts – that is, it is nonuniform. If, on the other hand, perception delivers a surface all of whose parts are equidistant from the subject, the surface as perceived has no concave or convex parts – that is, it is uniform. Since visual perception does not deliver distance from the subject, the visual phenomenology involves no distinction between a surface with concave or convex parts, i.e. a nonuniform surface, and a surface without concave or convex parts, i.e. a uniform surface. This distinction is delivered by tactile perception, which delivers distance from the subject. If this is Berkeley's explanation of uniformity, his view that visual perception delivers no flat shape is also derived from his phenomenological description that depth is not delivered by visual perception. Thus, my interpretation is that Berkeley's thesis (B*v*1), which supports the argument for (C5), is based on his phenomenological claim that depth is not delivered by visual perception.

The thesis (B*v*2), which can reinforce the argument for (C5), is a description based on an observation of a phenomenon called ‘perceptual constancy’ of shape. Consider an everyday case where we look at a square table while walking around it. It seems as though the square shape of the table remains constant. But it also seems as though the shape of the table changes. (Some would say that the shape seems to become trapezial, parallelogramic, and so on.) Berkeley would simply deny that, in this case, the shape as seen remains constant, using the case as evidence for (B*v*2). Then, is a phenomenon of ‘shape constancy’ evidence in favour of the argument for (C5)? I will discuss shape constancy in more detail later in my inquiry, and propose an account of it which is different from Berkeley’s.

Chapter 3:

Leibniz

Leibniz wrote *New Essays on Human Understanding* as his response to Locke's *Essay Concerning Human Understanding*. Thus, Leibniz answers Molyneux's Question in reaction to Locke's raising the question and answering it negatively. Leibniz's aim is to reject Locke's negative answer by criticising his failure to separate 'ideas' from perceptual experience. Leibniz holds the rationalist view that ideas of shape are contained in the mind prior to any perception, whereas Locke holds that ideas of shapes are passively received by perception (such ideas being the very objects of perception). On Leibniz's account, perception delivers 'images', which he strictly distinguishes from 'ideas' contained in the mind independently of perception. His positive answer to Molyneux's Question is based on his distinction between 'images' and 'ideas'.

In this chapter, I shall discuss Leibniz's account of 'images' and 'ideas' and his positive answer to Molyneux's Question in order to clarify his phenomenological view. I shall see in Section 1 that 'images' are mind-dependent objects of perception. However, I shall set aside this tenet, and concentrate on Leibniz's description of the way 'images' are. For what is relevant to Molyneux's Question and to my interest in the phenomenology is the way objects delivered by perception are, rather than what these objects are. So, when I clarify, in Section 1, Leibniz's view that there are no 'images' common to visual and tactile perceptions of shape (or what we ordinarily regard as visual and tactile perceptions of shape), I shall take it as a phenomenological thesis that visual and tactile perceptions of shape (or what we ordinarily regard as visual and tactile perceptions of shape) have nothing in common from the subjective viewpoint. I will take the same approach throughout this chapter. In Section 2, I shall interpret Leibniz's account of the relation between 'images' and 'ideas' of shape. The relation is such that the 'ideas' of shape, which consist of the definitions of shape, are applied to 'images'. I will ascribe to Leibniz the phenomenological theses that objects as seen and those as felt have no shape, and that they both are neither plane nor solid. In Section 3, I shall attribute to Leibniz another phenomenological view that 'images' have a determinate number of distinguished points. We will see that this view and his view of the relation between 'images' and 'ideas', with an appropriate hint given to Molyneux's subject, allow Leibniz to deliver a positive answer (despite the phenomenological theses I ascribe to him in Section 1 and Section 2). We will see that, although Leibniz, unlike Locke and Berkeley, gives a positive answer to Molyneux's Question, his phenomenological view would not deny the argument for (C5). On the contrary, his phenomenological view could be employed to support the claim (C2).

1. Visual and tactile 'images'

Let us begin with clarification of Leibniz's account of 'images', which are delivered to the mind through perception. Concerning visual perception, he writes:

> This is perfectly true: this is how a painting can deceive us, by means of an artful use of perspective. When bodies have flat surfaces they can be depicted merely by means of their outlines, without use of shading, painting them … . But such a drawing, unaided by shading, cannot distinguish definitely between a flat circular surface and a spherical surface – since neither contains any distinct points of distinguishing features – and yet

> there is a great difference between them without to be marked. That is why M. Desargues has offered rules about the effects of hue and shading.[108]

In Leibniz view, visual experience caused by a circular surface can be subjectively indistinguishable from visual experience caused by a spherical surface. That is, the shape as visually perceived could be the same whether the external object is circular or spherical. Visual perception is insensitive to whether the external shape is plane or solid.

Leibniz thinks that the mind makes a judgement as to the external shape based on colour experience. That is why 'a painting can deceive us'. If a circle in a painting is not shaded, the mind judges that there is a circle before the eyes. But if it is elaborately shaded, the mind is deceived into judging that there is a globe before the eyes. The above passage is followed by an explanation of two ways in which a judgement is mistaken when a painting deceives us. Although Leibniz talks of a judgement made in looking at a painting, we can draw a conclusion as to seeing in general; his account implies that the object of seeing is mind-dependent. He writes:

> … when we are deceived by a painting our judgments are doubly in error. First, we substitute the cause for the effect, and believe that we immediately see the thing that causes the image, rather like a dog barking at a mirror. For strictly we see only the image, and are affected only by rays of light. Since rays of light need time – however little – to reach us, it is possible that the object should be destroyed during the interval and no longer exist when the light reaches the eye; and something which no longer exists cannot be the present object of our sight. Secondly, we are further deceived when we substitute

[108] Leibniz (1981), p. 135.

> one cause for another and believe that what comes merely from a flat painting actually comes from a body.[109]

Let us focus on the first of the two errors that Leibniz says a judgement can make. Suppose a subject believes that she sees a globe when there is a shadowed circle in front of her. If Leibniz is right, the subject's judgement is mistaken because she takes the object of perception to be external although the object is, in fact, an *image* caused by the external object. Leibniz justifies this view by pointing out that the external object may not exist by the time the light reflected by it reaches the eye. The idea is that because the object of sight must exist, it cannot be the external object, which may or may not exist. This argument would apply not only to a case of looking at a painting but to visual perception in general. For it would be that whatever the object located in front of a perceiver, it may not exist when the light coming from it hits the eye. Leibniz's view is that visual perception delivers to the mind mind-dependent 'images' caused by flat or solid objects in the external world.

It might seem that Leibniz's account has not diverged from Locke's; Leibniz's account might seem to be that visual experience delivers two-dimensional shapes with shades of colour, based on which the mind judges three-dimensional shapes. However, his view is that objects as visually perceived, or visual 'images', are *neither two- nor three-dimensional*. I will clarify this later.

Let us turn to another view held by Leibniz. He thinks that there are no images common to visual and tactile experiences.[110] He imagines a blind man who has

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[109] Ibid., p. 135.

[110] Leibniz considers the object of touch, as well as that of sight, to be mind-dependent. He writes: 'This is how we come to believe that it is by an immediate real influence that we sense our bodies and the things which touch them, and move our arms, taking this influence to constitute the interaction between the soul and the body; whereas really all that we sense or alter in that way is what is within us' (ibid.,

learned geometry only by tactile experience and a paralytic man who has learned geometry only by visual experience.

> These two geometries, the blind man's and the paralytic's, must come together, and agree, and indeed ultimately rest on the same ideas, even though they have *no images in common*.[111]

Visual images used by the paralytic man for geometry and tactile images used by the blind man have nothing in common. In Leibniz's view, what we take to be a triangle delivered by sight and what we take to be a triangle delivered by touch, in fact, are entirely different. If we separate Leibniz's view here from his tenet that 'images' are mind-dependent objects, we can construe him to hold the following phenomenological thesis:

(LB*vt*1) Visual and tactile perceptions which are ordinarily taken to be as of shape have nothing in common from the subjective viewpoint.

(The thesis is not that visual shape perceptions have nothing in common from the subjective viewpoint, because, as we will see, Leibniz thinks that there is no shape perception. For him, we, in fact, mistakenly regard certain perceptions as shape perceptions.)

2. 'Images' and 'ideas'

In Leibniz's view, visual images do not vary with whether the external shapes are two- or three-dimensional. Moreover, there is no image common to what we ordinarily regard as visual and tactile experiences of shape. Why, then, can Leibniz

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p. 135).

[111] Ibid., p. 137, my italics.

give a positive answer to Molyneux's Question? There are two reasons, one bearing on the condition of the thought experiment, and the other bearing on the nature of the 'ideas' of shapes.

The first reason why Leibniz can give a positive answer is that he takes Molyneux's subject to be given the clue that the two shapes before him are a cube and a globe. (Let us hereafter call this clue the 'Leibniz hint', as James Van Cleve does.[112]) Leibniz takes this hint to be necessary for his positive answer.

> … I believe that if the blind man knows that the two shapes which he sees are those of a cube and sphere, he will be able to identify them and to say without touching them that this one is the sphere and this the cube.[113]

Leibniz holds that the newly sighted man could correctly name the shapes in front of him under the condition that he is told what the two shapes before him are.

To see how this condition allows Leibniz to give a positive answer, we need to turn to the second reason for his positive answer. The second, and philosophically more significant, reason is that *the same geometrical definitions are applicable to both visual and tactile images*. This thought derives from Leibniz's rationalist view of the *ideas* of shapes. In response to Locke's view that ideas of 'space' or 'extension', 'figure', 'rest' and 'motion' are 'simple ideas' received by sight and touch, Leibniz claims:

> These ideas which are said to come from more than one sense – such as those of space, figure, motion, rest – come rather from the common sense, that is, from the mind itself; for they are ideas of the pure understanding (though ones which relate to the external

[112] Van Cleve (2007).
[113] Leibniz (1981), p. 136.

> world and which the senses make us perceive), and so they admit of definitions and of demonstrations.[114]

On Leibniz's rationalist account, ideas of shapes are not acquired through perceptual experience. Rather, they come 'from the mind itself'; the mind has them before any perceptual experience. It is important that Leibniz strictly distinguishes 'ideas' of shapes from 'images' of them. Whereas Locke takes ideas of shapes to be received by perception, Leibniz holds them to require no perception. In his view, the mind already contains them prior to any perceptual experience. What are received through perception are 'images', as opposed to 'ideas'. His discussion of the geometry of a blind man and that of a paralytic man pertains to this view. After insisting that the geometry of a blind man and that of a paralytic man must 'rest on the same ideas' although they have 'no images in common', he concludes that this shows 'how essential it is to distinguish *images* from *exact ideas* which are composed of definitions'.[115] If two geometries learned by use of utterly different images can, or must, be the same, it follows that the ideas involved in the two geometries are not images. The conclusion also states that 'exact ideas' of shapes are 'composed of definitions'. For Leibniz, the mind can know the *definitions* of shapes before perceptual experience, and it is those definitions, rather than images, that constitute the ideas of shapes.[116]

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[114] Ibid., p. 128.

[115] Ibid., p. 137. See also Leibniz (1989).

[116] Leibniz distinguishes 'exact' or 'distinct ideas', consisting of definitions of shapes, not only from 'images' of shapes but from 'confused ideas' of shapes, which he says are 'confounded with' images (Leibniz (1981), p. 261). One example of a 'confused idea' he gives is an idea we would have if we are presented with a polygon with a thousand equal sides, or a regular chiliagon. Neither our sense of sight nor our imagination is capable of grasping the number of the sides the image has. We, then,

To see how Leibniz's answer to Molyneux's Question follows from his view of the 'ideas' of shapes, we also need to understand the relation between 'ideas' and 'images'. The relation between them is that of *application*. Ideas of shapes are applied to images. As we have seen, Leibniz regards ideas of shapes as prior to images. In his view, ideas of shapes are contained in the mind before perception delivers images. Therefore, we apply ideas which we already have to images we perceive. Leibniz is not explicit on this point concerning application, but it is a natural consequence of his account of the ideas and images. To clarify the point a little more, let us look at his remark on the innateness of geometry.

> … the whole of arithmetic and geometry should be regarded as innate, and contained within us in a potential way, so that we can find them within ourselves by attending carefully and methodically to what is already in our minds, without employing any truth learned through experience or through being handed on by other people. … So one could construct these sciences in one's study and even with one's eyes closed, without learning from sight or even from touch any of the needed truths … .[117]

Leibniz asserts that neither visual nor tactile experience is necessary for learning geometry. The reason is that the mind, before any perceptual experience, already has geometry in it. (Leibniz says that the mind contains it 'in a potential way' because, obviously, we do not have explicit knowledge of all the definitions, axioms, and theorems, although they are available to the mind from within itself.) In Leibniz's

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would not know what definition of shape is relevant to the image, thereby failing to have an 'exact' or 'distinct idea'. Unless we count the number of the sides (or perhaps angles), we would only have a 'confused idea'. (See ibid., pp. 261-2.) I will set aside this distinction between 'exact' or 'distinct ideas' and 'confused ideas', and will refer to Leibniz's 'exact ideas' simply as 'ideas', concentrating on the contrast between '(exact) ideas' and 'images' of shapes.

[117] Ibid., p. 77. See also ibid., p. 50; p. 86.

example we have introduced, a blind man and a paralytic man have 'learned geometry' by use of tangible shapes and visible shapes, respectively. As we will see presently, Leibniz does say that a blind man can *learn* geometry. However, we should take him to be using an ordinary expression rather than his philosophical one. Strictly speaking, his view would be that a blind man and a paralytic man need *not* learn geometry by tactile or visual perception, because they have it in their mind from birth. What they would need to learn is, rather, how to *apply* ideas (or definitions) of shapes to images. That is why Leibniz maintains that their geometries must 'rest on the same idea'. Although the images they obtain from perception are different, they apply the same innate ideas to the images.

It follows from Leibniz's account of 'images' and 'ideas' that *visual and tactile images have no shape*. Leibniz explicitly maintains that shape is not delivered by perception. Leibniz's examples of what are delivered through perception are colour and flavour.[118] While perception delivers images that have no shape, the mind applies to them ideas of shape, which the mind possesses prior to perception. If one claims that visual and tactile images do have shape, one is already applying the idea of shape to images. Leibniz would therefore endorse the following phenomenological thesis:

(LB*vt*2) The objects as visually or tactilely perceived have no shape.

It also follows from Leibniz's account that images are themselves *neither two- nor three-dimensional*. Two-dimensional shapes, such as a triangle, oval, etc., and three-dimensional shapes, such as a sphere, tetrahedron, etc., all have a definition, and so are 'ideas'. The mind contains those ideas (or definitions) of plane and solid

[118] Ibid., p. 392.

shapes, and applies them to visual and tactile images. If one insists, as Locke does, that visual images are two-dimensional, for example, one is already applying ideas of two-dimensional shapes to visual images. Even two-dimensionality and three-dimensionality of space would have a geometrical definition. Two-dimensionality and three-dimensionality, respectively, would be defined in terms of two and three straight lines perpendicular to each other, and so are ideas applied to images. Indeed, Leibniz claims that even a 'straight line' is not an image but an idea constituted by a definition. He complains that Euclid does not provide an adequate definition of a straight line. Leibniz writes that the definition of a straight line Euclid 'offers provisionally is unclear, and useless to him in his demonstrations'.[119] Leibniz's complaint here is that Euclid's definition partly rests on an image, but an image cannot serve to provide us with 'demonstrations', or 'connections between distinct ideas'.[120] Leibniz's example is the statement that two straight lines can intersect with each other only once. If Leibniz thinks that there is no such thing as a 'connection' of two images of straight lines intersecting once, he would also deny that there is a 'connection' of two or three images of straight lines intersecting perpendicularly with each other. Such a 'connection' would require the 'exact' or 'distinct idea' of a straight line, which is the definition of a straight line. (Leibniz thinks that the definition is 'the shortest line between two points'. What is important for us here is not Leibniz's definition of a straight line, but his claim that there is not even an image of a straight line, there being only the idea, or definition, of a straight line.) For Leibniz, no image is a straight line in itself, and so we apply to images the idea

[119] Ibid., p. 451. Euclid's definition of a straight line is this: 'A straight line is a line which lies evenly with the points on itself' (Euclid (1956), p. 153).
[120] Leibniz (1981), p. 451. Leibniz claims that Euclid is therefore obliged to rely on the axioms mentioning a straight line.

of a straight line (or the first dimension), the second dimension (perpendicular to the first), and the third dimension (perpendicular to the first two). Even when one simply insists that visual or tactile experience delivers depth, one is applying the idea of the third dimension, which is added to the first two dimensions, to visual or tactile images. Visual and tactile images *per se* are neither plane nor solid.

Thus, when Leibniz holds that the same visual image can be caused either by a solid physical object or by a flat physical object, he does not mean that the visual image is two-dimensional. What he means is rather that the same visual image, *which is neither plane nor solid*, can be caused by a solid surface or a flat surface in the environment. Leibniz would presumably deal with tactile images in a slightly different way. He would explain that, whereas, for example, a circle and a globe before the eyes can cause the same visual image, a circle and a globe cause different tactile images. It would be strange for him to claim that experience of touching a painting can 'deceive' the mind into judging that there are solid objects in the environment. Leibniz would take deception by a *trompe l'oeil* painting to be peculiar to the case of sight. Of course, Leibniz would still maintain that a tactile image is neither plane nor solid in itself. For him, that images caused by plane and solid shapes in the environment are different would not imply that they are plane or solid; the difference between images would not be in their dimensionality. If one says that a tactile image caused by a circle is two-dimensional, or that a tactile image caused by a globe is three-dimensional, one is already applying an idea to the tactile image.

'Images', which are delivered by perception, are neither plane nor solid. Or, they are not 'exact' or 'distinct' enough to be plane or solid. For Leibniz, things that 'come to us through the senses' are things that come 'from our confused perceptions'.[121] We can thus say that the following is Leibniz's phenomenological view:

(LB*vt*3) The objects as visually or tactilely perceived are neither two- nor three-dimensional.

Let us notice that the above interpretation of Leibniz's account of the relation between 'ideas' and 'images' is compatible with Leibniz's response to Locke's view of 'resemblance' between the *qualities* of the external objects and the *ideas* caused by them. Leibniz directs his argument against Locke's account that 'secondary qualities' of the external objects, such as colour and pain, have no resemblance to the ideas of them. Leibniz's argument is that God must have established a resemblance between secondary qualities and sensations caused by them, as well as between primary qualities and sensations. What Leibniz means by 'resemblance' here is a relationship of *orderly correspondence*. His example is the relationship between a circle and various projections of it such as an ellipse, parabola and hyperbola. He writes that 'there is a certain precise and natural relationship between what is projected and the projection which is made from it, with each point on the one corresponding through a certain relation with a point on the other'.[122] What is of significance is that Leibniz takes such orderly correspondence as obtaining between secondary qualities and sensations. He goes on to claim that motions of a pin should correspond to sensation of pain caused by the pin. He says: 'It is true that pain does not resemble the movement of a pin; but it might thoroughly resemble the motions

[121] Ibid., p. 392.
[122] Ibid., p. 131.

which the pin causes in our body …'.[123] When a pin is slowly pressed against the skin, a sensation of pain slowly undergoes some change. The movement of the pin and the change of the pain might have no resemblance in Locke's sense, but there is an orderly correspondence between their parts, i.e. between the parts of the movement and the minute phases of the change of the sensation. Leibniz's view would then be that there is the same sort of orderly correspondence between an external shape and an image caused by it. This does not imply that an image has shape. Parts of movement of a pin correspond to successive phases of pain, although pain does not involve movement. Similarly, parts of the external shape correspond to parts of an image, although an image has no shape. Naturally, Leibniz's account allows that a visual or tactile image, caused by a plane or solid shape, is neither plane nor solid.

3. The number of points on an image

We apply 'ideas' of shapes to 'images'. So, for Leibniz, Molyneux's Question is to be formulated as follows: 'could the newly sighted man apply the ideas, or definitions, of a cube and a globe to the two images given to him through sight?' Leibniz's answer is that the man could, provided that he is given the 'Leibniz hint'. The following is how he justifies his answer to Molyneux's Question:

> Given this condition [that the subject is told what two shapes are being shown], it seems to me past question that the blind man whose sight is restored could discern them by applying rational principles to the sensory knowledge which he has already acquired by touch. … My view rests on the fact that in the case of the sphere there are no distinguished points on the surface of the sphere taken in itself, since everything there is

[123] Ibid., p. 132.

> uniform and without angles, whereas in the case of the cube there are eight points which are distinguished from all the others.[124]

Molyneux's subject is informed that a cube and a globe are placed before him. One of the images has no prominent point on it, and the other image has eight prominent points. Here Leibniz supposes that the number of distinguished points on a visual image coincides with that on the external shape causing the image. (He seems to imagine a cube made of sticks or wires rather than one made of opaque sides, such that none of the eight vertices is occluded by the sides.) According to the subject's knowledge of definitions, which is available to him from birth, the surface of a globe, by definition, has no particular point to be treated differently from other points on it, whereas the surface of a cube, by definition, has eight of such points, namely, eight vertices. Thus, he could apply the idea of a globe to an image with no salient point, and the idea of a cube to an image with eight salient points.

We can now see why Leibniz thinks that Molyneux's subject needs to be told beforehand what two shapes are before him. Leibniz writes:

> … to return to the man born blind who begins to see, and to what he would judge about the sphere and the cube when he saw but did not touch them: as I said a moment ago, I reply that he will know which is which if he is told that, of the two appearances or perceptions he has of them, one belongs to the sphere and the other to the cube. But if he is not thus instructed in advance, I grant that it will not at once occur to him that these paintings of them (as it were) that he forms at the back of his eyes, which could come from a flat painting on the table, represent bodies.[125]

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[124] Ibid., pp. 136-7.
[125] Ibid., p. 138. Leibniz describes what are given to Molyneux's subject through sight as 'paintings … that he forms at the back of his eyes'. It might be that Leibniz

When the blind subject is made to see, the two visual images he experiences are neither plane nor solid. Moreover, they are what could be caused either by solid objects or by 'a flat painting'. From the first-person point of view, there is nothing based on which the subject could know whether to apply ideas of solid shapes or those of flat shapes to the two visual images. So, if the subject is not given the hint, he might apply an idea of a plane shape with eight distinguished points and an idea of a plane shape with no distinguished points. The clue in question is required for excluding the possibility of applying ideas of two-dimensional shapes.[126] (I think that, if Leibniz's answer is right, Molyneux's subject would need the Leibniz hint not only to avoid applying ideas of plane shapes to the two visual images, but to

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identifies 'images' with plane images on the retina. If he does, it should be that the description here is given from the third-person point of view, i.e. through our applying the idea of flatness, or ideas of flat shapes, to the images on the retinas. From the first-person point of view, the images themselves are not even flat.

[126] Leibniz writes that Molyneux's subject would not need the hint in question if the subject, the objects, or the light source moved. Arguing that Molyneux's subject would need the clue, Leibniz writes as follows: '[The thought that the plane images represent solid bodies] will occur to him only when he becomes convinced of it by the sense of touch or when he comes, through applying principles of optics to the light rays, to understand from the evidence of the lights and shadows that there is something blocking the rays and that it must be precisely the same thing that resists his touch. He will eventually come to understand this when he sees the sphere and cube rolling, with consequent changes in their appearances and in the shadows they cast; or when, with the two bodies remaining still, the source of the light falling on them is moved or the position of his eyes changes. For these are pretty much the means that we do have for distinguishing at a distance between a picture or perspective representing an object and the real object' (ibid., p.138). For example, the way a flat polygonal shape casts a shadow when it rotates differs from the way a cube does when it rotates. This would result in a difference between an image caused by the shadow of a rotating polygon and an image caused by the shadow of a rotating cube. Thus, if the cube and the globe were rotating, Molyneux's subject, by employing knowledge of optics, would be able to exclude the possibility of there being an image caused by a shadow of a polygonal shape, and therefore would not need the clue. We will not go into a detailed discussion of this explanation. It does not affect Leibniz's phenomenological view, which is the focus of our interest.

avoid applying an idea of a solid shape that is not a cube and yet has eight distinguished points by definition, or an idea of a solid shape that is not a sphere and yet has no distinguished point.)

Giving the above argument for his positive answer to Molyneux's Question, Leibniz does not simply take it for granted that the newly sighted man would know how to apply the definitions of shapes to the two visual images. For Leibniz's view that we can have knowledge of the definitions of shapes prior to perceptual experience does not entail that we can also have, before perception, knowledge of how to apply the definitions to visual images. How, then, does Leibniz justify his thought that Molyneux's man could apply the ideas of shapes to the two visual images? Leibniz has two justifications. Immediately after the above passage, he goes on to say:

> If there were not that way of discerning shapes, a blind man could not learn the rudiments of geometry, and indeed always have some rudiments of a natural geometry; and we find that geometry is mostly leaned by sight alone without employing touch, as could and indeed must be done by a paralytic or by anyone else to whom touch is virtually denied.[127]

The first argument is to the following effect. For blind people, tactile images are the first images they encounter. Nevertheless, they are generally capable of learning (at least) basic geometry; they generally know how to apply the innate ideas of shapes to tactile images. One method would be to base the application of the definitions on the number of prominent points found on tactile images. (Leibniz does not say that it is the only method, or that it is the only 'way of discerning shapes'.) Therefore, if blind

[127] Ibid., p. 137.

people were made to see, they could use the same method again, applying definitions of shapes to visual images based on how many prominent points each image has. The second argument is rather simple. Leibniz points out that 'geometry is mostly learned by sight alone without employing touch'. He is presumably considering the fact that most children learn geometry by looking at figures drawn by their teacher and those drawn in a textbook. Leibniz is confident enough to maintain that feeling shapes is not necessary for learning geometry. If Leibniz is right in holding that we can learn geometry only by seeing figures, it follows that visual images themselves have a characteristic that allows us to apply definitions of shapes to them. It in turn follows that a newly sighted man could apply the innate ideas of shapes to visual images before touching the objects. The above two arguments support Leibniz's conclusion that Molyneux's man could apply the innate ideas of shapes to the two visual images in virtue of the salient points that each of the images has or lacks (provided that he is given the Leibniz hint).

It is worth noting that, on Leibniz's account, Molyneux's subject would not need to rely on any knowledge he has acquired by touch. Marjolein Degenaar, interpreting Leibniz's answer to Molyneux's Question, writes that '[a] person blind from birth acquire the faculty of sight would, said Leibniz, be capable of distinguishing a sphere from a cube using his understanding and the knowledge acquired through the sense of touch, or with the aid of exact ideas of the forms of both objects'.[128] However, Leibniz would say that Molyneux's subject would need no knowledge acquired by touch. In the first place, the mind acquires no knowledge as to shape or geometry by touch (or by sight). Furthermore, Leibniz asserts that we can learn geometry solely by sight, that is, without the sense of touch. This implies that

[128] Degenaar (1996), p. 44.

application of the innate ideas of shapes to visual images requires no tactile experience. The consequence would be that Molyneux's man, even if he had also lacked the sense of touch, would be able to apply the ideas of shapes to the two visual images (if he is given the Leibniz hint). So, when Leibniz appeals to the fact that a blind man always knows basic geometry, he is not arguing that Molyneux's man, when he was blind, would have been able to employ knowledge of basic geometry acquired from tactile experience in naming a cube and a globe by touch. On Leibniz's account, there would have been no need for the man to acquire that knowledge from tactile experience, or from any experience, because the knowledge is in the mind from birth. Nor is Leibniz arguing that the formerly blind man would have acquired, from tactile experience, knowledge to the effect that he could apply ideas of shapes to perceptual images based on the number of prominent points found on the images, thereby being able to use that knowledge to apply ideas of shapes to the two visual images. For Leibniz also takes that knowledge to be available even without tactile experience; he thinks that a person lacking the sense of touch could apply ideas of shapes to visual images. Blind people's knowledge of basic geometry, for Leibniz, is not a proof of the possibility of knowledge acquisition by touch. Rather, it is, for him, a proof of the possibility of application of the innate ideas of shapes even to the first images encountered – or the possibility of application based on the number of salient points on completely unfamiliar images.

Leibniz thinks that there is nothing common to visual and tactile images to which we apply ideas of shapes. However, he would have to admit that they all have *a determinate number of prominent points*. He holds that we learn to apply ideas of shapes by relying on the number of distinguished points on images. On his view, it is necessary for our applying definitions of shapes to images that each image has a certain number of prominent points. Leibniz supposes that this is true of both visual and tactile images. For example, an image to which we apply the idea of a cube, whether visual or tactile, has eight prominent points. Leibniz's accepting this would be compatible with the thought that there is nothing common to visual and tactile images. He could deny that the *number* of prominent points is an image additional to the prominent points – e.g. that we obtain the ninth image, which is an image of the number, after counting eight prominent points on a certain image.

One might insist that Leibniz also regards 'points' as common to visual and tactile images. Leibniz does say that one of the images experienced by Molyneux's man has 'eight points which are distinguished from all the others'. Since Leibniz thinks that a tactile image to which the idea of a cube also has eight distinguished 'points', it might seem to follow that 'points' are homogeneous across visual and tactile images. However, Leibniz can be interpreted coherently if we take 'distinguished points' to mean 'distinguished parts of images to which we would apply the idea of a point'. I adopt this interpretation, on which Leibniz need not admit that 'points' are common to visual and tactile images, because he holds the phenomenological thesis (LB*vt*1). Moreover, Leibniz thinks that even a 'straight line', which is a basic geometrical element figuring in the axioms, is not an image delivered through perception, but is an idea, or a definition, contained in the mind from birth. So, he would presumably explain that a 'point', which is another basic geometrical element constituting the axioms, is also not delivered by perception, but is contained in the mind prior to perceptual experience. This interpretation accords with Leibniz's remark that 'the whole of arithmetic and geometry should be regarded as innate, and contained within us in a potential way'. The mind contains not only the axioms, theorems, and definitions of plane and solid shapes, but also the definitions of the basic terms that constitute them. Leibniz's account would be that the idea (or definition) of a 'point' is applied to salient parts of images. (Leibniz would say that applying the idea of a 'point' to prominent parts of images is one method for applying geometry to images. Since such a method would be for the purpose of applying the whole of geometry to images, he would acknowledge that the method itself would not be backed by geometry. It would thus be that we only happen to use such a method.)

One might defend the opposing interpretation by arguing as follows. 'Points' as such might not be common to visual and tactile images. But Leibniz would admit that the eight distinguished points as seen by Molyneux's subject are images of the *smallest visible size*. Leibniz would also admit that the subject has been applying the idea of a 'point' to images of the smallest tangible image. The conclusion is that for Leibniz, the *smallest possible size of an image* is common to shapes as seen and shapes as felt. However, even if Leibniz thinks that the eight prominent points are the smallest parts of one of the two visual images experienced by Molyneux's subject, it will not follow that he takes the smallest size to be common to visual and tactile images. This is supported by what Leibniz says concerning an image of size.

> The having of an image of something so small [as what is implied by the infinite divisibility of matter] is utterly beside the point. Such an image is impossible, given how our bodies are now constituted. If we could have it, it would be pretty much like the images of things which now appear to us as within range of our awareness; but we should have to pay a price, for the present object of our imagination would be lost to us, becoming too large to be imagined. *There are no images of size, in itself; and the images*

of it which we do have depend merely on comparing things with our organs and with other objects.[129]

Any image of size must be of a size relative to the sizes of our body and other objects we normally perceive.[130] An important implication of this is that no image of size is an image of a definite or absolute size. Suppose that Leibniz acknowledges that the eight distinguished points as seen by Molyneux's man are the smallest parts of one of the visual images. For Leibniz, this would only mean that they are *smaller than other parts* of present images, but not that they are the smallest visible parts. If Molyneux's man was given a visual image smaller than the eight prominent parts, the parts would not be the smallest. Leibniz would deny that any visual or tactile image could have the smallest possible size. For the view that there is the smallest possible size of an image entails that that size is absolute – i.e. that the size is the smallest without any relation to other images. The smallest visible or tactile images in one case might not be the smallest images in another case. There is no image of the smallest size that could be common to visual and tactile images. Thus, we should put Leibniz's phenomenological view in the following way:

(LB*vt*4) The objects as visually or tactilely perceived have a determinate number of prominent parts.

We can now conclude that Leibniz's positive answer to Molyneux's Question follows from two views. One is his rationalist view that we can know definitions of shapes without relying on any perceptual experience. The other view, which rests on the phenomenological thesis (LB*vt*4), is that an image and the external shape causing

[129] Ibid., p. 263, my italics.
[130] Leibniz's point in the quoted passage is that we, therefore, cannot have an image of a size as small as infinitely divided matter, but can have an 'idea' of such a size.

the image share the number of distinguished parts. It follows from the latter view that when Molyneux's subject starts to see, one of the objects delivered by sight would have eight prominent parts, and the other would have no prominent part. Then, despite the theses (LB*vt*1), (LB*vt*2), and (LB*vt*3), if Molyneux's subject is informed that a cube and a globe are before him, he could determine which definitions of shapes to apply on the basis of the numbers of salient parts delivered by visual perception.[131]

4. Conclusion

Despite his positive answer to Molyneux's Question, Leibniz's phenomenological view would not deny the argument for (C5). Leibniz's reason for his positive answer is not that both visual and tactile perceptions deliver solid shapes such as a cube and a globe. On the contrary, he holds the phenomenological thesis (LB*vt*2) that perception, whether visual or tactile, delivers no shape. As we discussed, the thesis (LB*vt*2) entails the thesis (LB*vt*3) that the objects as perceived are neither two- nor three-dimensional. So, Leibniz's phenomenological view does not support the claim (C1) – that the description of the objects as tactilely perceived mentions both flat and solid shapes. However, Leibniz's view could be employed to support the claim (C2) – that the description of the objects as visually perceived mentions no

[131] We can say that Leibniz would have given a positive answer to the two-dimensional version of Molyneux's Question on the same grounds. His explanation would be as follows. If a newly sighted subject is shown a square and a circle, the two visual images he experiences would have no shape. Nor would the images be flat or solid. They, however, would have four distinguished points and no distinguished point. If the subject is told that the two shapes before him are a square and a circle, he would be able to apply the definition of a square to the image with four salient parts, and the definition of a circle to the image with no salient part. Leibniz would say that there is no essential difference between Molyneux's Question and the two-dimensional version of it.

solid object. The proponent of the argument for (C5) might agree with (LB*vt*3) only with respect to visual perception, deriving the thesis that the objects as seen are neither two- nor three-dimensional.

What does it mean to insist that (LB*vt*3) is true of visual experience? The Leibnizian claim that the objects as visually perceived are neither two- nor three-dimensional is stated in a similar way as Berkeley's thesis (B*v*1) that the shapes as visually perceived are neither flat nor solid. However, the Leibnizian claim, unlike Berkeley's thesis, would not be based on a denial that depth is delivered by visual perception. The Leibnizian claim would rather be based on the thought that the objects as seen are not so 'exact' or 'distinct' as the geometrical definitions of plane and solid shapes, or as the definitions of two- and three-dimensionality. In my final chapter, I will endorse this Leibnizian claim concerning visual perception. I will show that endorsing it, as well as (C1), is compatible with denying the argument for (C5).

Chapter 4:

Reid

Although Reid neither mentions the name William Molyneux nor refers to Locke's first introduction of Molyneux's Question, he does consider Molyneux's Question. He considers a case in which a newly sighted man is visually presented with a cube and a sphere, explaining what he would be able to see and discern. Reid's answer to Molyneux's Question would be negative, (partly) because of his phenomenological view that the shapes as visually perceived are flat. Reid also has extensive discussion on Dr Saunderson, a blind mathematician of the University of Cambridge, asking what he would see and discern if he was made to see. His discussion suggests that his answer to Molyneux's Question would be positive regarding a subject with mathematical ability, provided that the subject is given the Leibniz hint. For Reid thinks that the shapes as seen, if they are small enough, have mathematical properties such that they are the same as the projected shapes of the external shapes.

I will clarify Reid's phenomenological view as to shape perception which underlies his treatment of the two thought experiments, one concerning an ordinary blind person and the other concerning a blind mathematician. I will begin with a clarification of Reid's account of tactile perception, which is necessary to fully understand his view of visual perception of shape.

1. ‘Sensations of touch’

Reid calls ‘sensations’ of touch ‘natural signs’, which are contrasted with ‘artificial signs’ used for communication among people. Sensations of touch are signs that signify or ‘suggest’ such ‘real external qualities’ as hardness, extension, shape, motion, space, etc.[132] Reid says that sensations of touch ‘are invariably connected with the conception and belief of external existences’.[133] He also holds that the connection between sensations of touch and the ‘conception and belief of external existences’ is not established by habit, but is ‘the effect of our constitution’ which ‘ought to be considered as an original principle of human nature’.[134] What are a ‘conception and belief’? Reid does not define them. He writes that ‘every man that has any belief … knows perfectly what belief is, but can never define or explain it’.[135] What, then, is an ‘original principle of human nature’? It is a principle of ‘common sense’. Reid writes: ‘If there are certain principles, as I think there are, which the constitution of our nature leads us to believe, and which are under a necessity to take for granted in the common concerns of life, without being able to give a reason for them; these are what we call the principles of common sense … .’[136] Thus, when Reid holds that sensations of touch have a necessary connection with the ‘conception and belief’ concerning hardness, extension, shape, and so on, he seems to think that the ‘connection’ and the ‘conception and belief’ are embedded in what he calls the ‘principles of common sense’. For example, when I have a sensation of touch and come to have a belief that there is shape existing externally, it

[132] Reid (1785), p. 118.
[133] Ibid., p. 116. See also ibid., p. 119.
[134] Ibid., p. 116. See also ibid., p. 119.
[135] Ibid., p. 48.
[136] Ibid., p. 52.

is the ‘principles of common sense’ that make me have that belief in having the sensation.[137]

Since our purpose here is to clarify Reid’s view on the phenomenology of tactile experience, we will not go into a discussion on his notion of a ‘conception’, ‘belief’, or ‘common sense’. What is important for our purpose is that a ‘conception’ or ‘belief’ concerning shape is something separate from ‘sensations’ (unlike Locke’s ‘simple idea’, which is received by perception).[138] Whereas ‘sensations’ are relevant to Reid’s phenomenological view, a ‘conception and belief’ are not. This will become clearer in our discussion below.

What are ‘sensations of touch’ like? Reid says that it is difficult to attend to sensations, for they ‘pass through the mind instantaneously’, signifying or suggesting extension, shape, hardness, etc.[139] Reid even says that they have ‘no name in any language’.[140] Nevertheless, Reid holds that we are able to attend to sensations of touch.

> By a proper degree of reflection and attention we may understand them perfectly, and be as certain that they are not like any quality of the body.[141]

Reid insists that if we attend to sensations of touch, it becomes manifest that they are unlike any of the external qualities such as shape, hardness, etc. He claims that

[137] For Reid, the ‘principles of common sense’ is one of the three ways we come to have a conception and belief in virtue of a ‘natural sign’. He writes: ‘… there are three ways in which the mind passes from the appearance of a natural sign to the conception and belief of the thing signified; by original principles of our constitution, by custom, and by reasoning’ (ibid., p. 391).
[138] Reid explicitly denies that the ‘conceptions’ or ‘notions’ of extension, shape, motion, and space originate from visual or tactile experience (ibid., p. 125; p. 127).
[139] Ibid., p. 121. See also ibid., p. 147.
[140] Ibid., p. 119. See also ibid., p. 121; p. 145.
[141] Ibid., p. 146.

sensations have no resemblance at all to any of the qualities suggested by them. He writes:

> When I grasp a ball in my hand, I perceive it at once hard, figured, and extended. The feeling is very simple, and hath not the least resemblance to any quality of body. Yet it suggests to us three primary qualities perfectly distinct from one another, as well as from the sensation which indicates them. When I move my hand along the table, the feeling is so simple, that I find it difficult to distinguish it into things of different natures; yet it immediately suggests hardness, smoothness, extension and motion, things of very different natures, and all of them as distinctly understood as the feeling which suggests them.[142]

When I touch a physical object, the sensation might suggest various different qualities such as hardness, shape, extension, smoothness, and motion. Reid's point is that the sensation I have would be too simple to resemble all of them. Therefore, a sensation of touch resembles none of the qualities it suggests. That is, a sensation of touch itself has none of hardness, shape, extension, smoothness, and motion.

The following is Reid's conclusion of the chapter on the sense of touch.

> That we have clear and distinct conceptions of extension, figure, motion, and other attributes of body, which are neither sensations, nor like any sensations, is a fact of which we may be as certain, as that we have sensations. And that all mankind have a fixed belief of an external material world, a belief which is neither got by reasoning nor education, and a belief which we cannot shake off, even when we seem to have strong arguments against it, and no shadow of argument for it, is likewise a fact, for which we have all the evidence that the nature of the thing admits. These facts are phenomena of

[142] Ibid., p. 120. See also ibid., p. 64; p. 145.

> human nature, from which we may justly argue against any hypothesis, however generally received.[143]

Reid's distinction between sensations of touch, on the one hand, and conceptions and beliefs, on the other is now clear. According to him, we have 'distinct conceptions' of such qualities as extension, shape, etc., which are 'real external qualities', and have a 'fixed belief' regarding the 'external material world'. Sensations of touch are connected with such conceptions and beliefs, but lack any of the qualities that external material bodies have.

Thus, Reid thinks that sensations of touch do not have shape, although they are connected with a conception or belief concerning shape. We can conclude that Reid holds the following phenomenological view:

(R*t*) The objects as felt have no shape.

2. Visible figures

Let us turn to Reid's phenomenology of visual shape perception. In the case of visual perception, what correspond to 'sensations of touch' are 'visible appearances of objects'.[144] 'Visible appearances' are 'natural signs' that signify external objects with distance, shape, size, colour, etc. Reid says that they have no name in language, and that we do not normally attend to them. His claim is that we should distinguish between visible appearances and external objects signified by them.[145]

A notable difference of 'visible appearances' from 'sensations of touch' is in that 'visible appearances' have shape. Indeed, they have two-dimensional shapes.

143 Ibid., p. 150.
144 Ibid., p. 165.
145 Ibid., pp. 164-5.

> … when I look at the book, it seems plainly to have three dimensions, of length, breadth, and thickness: but it is certain that the visible appearance hath no more than two, and can be exactly represented upon a canvas which hath only length and breadth.[146]

Reid thinks that a painter who draws a picture in perspective attends to visible appearances, distinguishing the shapes of visual appearances, or 'visible figures', from the shapes they signify. Although visual appearances lack depth, they do have two-dimensional shapes. Reid is baffled by this, and asks what sort of being 'visible figure' is. He, however, does not give a definite answer.[147]

Sensations of touch, which are 'natural signs', necessarily suggest external qualities. Similarly, 'visible figures', which are also 'natural signs', necessarily signify external shape.

> Nature intended visible figure as a sign of the tangible figure and situation of bodies, and hath taught us by a kind of instinct to put it always to this use. Hence it happens, that the mind passes over it with a rapid motion, to attend to the things signified by it. It is as unnatural to the mind to stop at the visible figure, and attend to it, as it is to a spherical body to stop upon an inclined plane. There is an inward principle, which constantly carries it forward, and which cannot be overcome but by a contrary force.[148]

After the chapter 'Of Touch', Reid, as in the above passage, occasionally uses the word 'tangible figure' to mean external shape. He has already explained that sensations of touch do not have shape, but are connected with conceptions or beliefs concerning external shapes. So he presumably thinks it clear that 'tangible figure' means external shape. In his view, just as sensations of touch make us have a

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[146] Ibid., p. 169.
[147] Ibid., pp. 202-4.
[148] Ibid., pp. 210-11.

conception and belief as to external qualities, so a ‘visible figure’ makes us have a conception and belief as to an external shape.

Reid, however, thinks that ‘visible figure’, being two-dimensional, does not signify depth. He writes:

> The distance of objects from the eye, is the most important lesson in vision. … [W]hen I look at a globe which stands before me, by the original powers of sight I perceive only something of a circular form, variously coloured. The visible figure hath no distance from the eye, no convexity, nor hath it three dimensions; even its length and breadth are incapable of being measured by inches, feet, or other linear measures. But when I have learned to perceive the distance of every part of this object from the eye, this perception gives its convexity, and a spherical figure; and adds a third dimension to that which had but two before.[149]

When a globe is in front of a subject, the ‘visible figure’ is circular. It signifies an external object with some external qualities, but signifies no depth or three-dimensional object. For Reid, visual perception of depth is ‘acquired perception’, which he says is the ‘fruit of experience’.[150] He discusses five experiences that can come to signify depth after repeated experiences. They are: the effort to contract or relax the muscles of each eye (or a sensation following it), the effort to diverge or converge both eyes (or a sensation following it), the degree of faintness of colour, the kinds of things contiguous with the object or things intervening between the object and the eyes (when the sizes of those things are already known), and the apparent size of the object.[151] What is relevant to our discussion is that those experiences that could be involved in the act of seeing are not intrinsic to ‘visible

[149] Ibid., pp. 415-6.
[150] Ibid., p. 375.
[151] Ibid., pp. 393-415.

figure'. So, when they come to signify depth, or when perception 'adds a third dimension to that which had but two before', 'visible figure' as such still does not signify depth.[152] Reid's phenomenological view as to visual shape perception is as follows:

(R*v*1) The shapes as seen are flat.

3. An ordinary blind subject

Reid considers a case where an ordinary blind person, who does not have sophisticated mathematical knowledge, recovers from blindness. Regarding this case, Reid's answer to Molyneux's Question would be negative, (partly) because of the thesis (R*v*1).

> To a man newly made to see, the visible appearances of objects would be the same as appearance of objects would be the same to us; but he would see nothing at all of their real dimensions, as we do. He could form no conjecture, by means of his sight only, how many inches or feet they were in length, breadth, or thickness. He could perceive little or nothing of their real figure; nor could he discern that this was a cube, that a sphere; that this was a cone, and that a cylinder.[153]

If there are three-dimensional shapes such as a cube, sphere, cone, and cylinder in front of a newly sighted person, he would be given two-dimensional 'visible figures'. Those 'visible figures' would lack depth. Nor would they suggest depth or three-dimensional shapes. In order for the newly sighted subject to be able to have a conception and belief regarding depth or three-dimensional shape while having

[152] See ibid., p. 168.
[153] Ibid., p. 170.

visual experience, 'acquired perception' would be necessary. That is, the subject would need to have many more visual experiences until the five kinds of experiences that Reid lists come to be habitually connected with a conception and belief concerning depth.

The above account clearly entails a negative answer to Molyneux's Question. Molyneux's subject would be given two 'visible figures' which are two-dimensional. They would not be connected with a conception or belief as to a cubical or spherical shape. Nor would the five kinds of experiences which could be involved in the act of seeing be connected with a conception or belief as to a cube or sphere, for they would not yet be connected with a conception or belief as to depth. Molyneux's subject would be able to name the cube and sphere if he touched them. Having classified perceptions into 'original' and 'acquired' perceptions, Reid says that the 'perception which I have by touch, of the hardness and softness of bodies, of their extension, figure, and motion, is not acquired, it is original'.[154] Sensations of touch can suggest three-dimensional shapes without our needing to form a habitual connection between the sensations and the conceptions or beliefs. So Reid would assume that Molyneux's man, or any formerly blind person or any blind person, could have the conceptions and beliefs concerning a cube and a globe if he touched a cube and a globe. However, there seems to be no way in which the necessary connection between sensations of touch and the conceptions or beliefs as to a cube and a globe (included in 'our constitution') could help Molyneux's man obtain these conceptions when given two plane 'visible figures'. Thus, we can say that Reid would base a negative answer to Molyneux's Question on two views. One is the phenomenological view (R*v*1) that the shapes as seen are flat. The other is that a

[154] Ibid., p. 376.

conception or belief concerning depth need to be habitually connected with the five kinds of experiences involved in the act of seeing.

4. A blind mathematician

Reid, in a later section, returns to the question of whether a newly sighted man could name shapes put before his eyes, but with a much more intelligent subject.

> … let us suppose such a blind man as Dr Saunderson, having all the knowledge and abilities which a blind man may have, suddenly made to see perfectly. Let us suppose him kept from all opportunities of associating his ideas of sight with those of touch, until the former become a little familiar; and the first surprise, occasioned by objects so new, being abated, he has time to canvass them, and to compare them, in his mind, with the notions which he formerly had by touch; and in particular to compare, in his mind, that visible extension which his eyes present, with the extension in length and breadth with which he was before acquainted.[155]

In Reid's view, if Dr Saunderson recovered from blindness, he could carry out the task better than an ordinary subject who is made to see. For there is a *resemblance* and a *necessary mathematical connection* between visible figures and external shapes, and so Dr Saunderson's mathematical knowledge would be useful. Reid writes as follows:

> Although there is no resemblance, nor … any necessary connection between that quality in a body which we call its *colour*, and the appearance which that colour makes to the eye, it is quite otherwise with regard to its *figure* and *magnitude*. There is certainly a resemblance, and a necessary connection, between the visible figure and magnitude of a body, and its real figure and magnitude; no man can give a reason why a scarlet colour

[155] Ibid., p. 248.

> affects the eye in the manner it does; no man can be sure that it affects the eye in the same manner as it affects the eye of another, and that it has the same appearance to him as it has to another man; – but we can assign a reason why a circle placed obliquely to the eye, should appear in the form of an ellipse. The visible figure, magnitude, and position may, by mathematical reasoning, be deduced from the real … .[156]

Reid maintains that there is a resemblance and necessary connection between a visible figure and the external shape. He explains that a visible figure is the same as a shape of the projection of the external shape onto the interior surface of a sphere.[157] (It is not the same as the shape projected onto a flat surface because the retina has a spherical surface.) The visible appearance of a circle viewed from an angle is elliptical because the projection of a slanted circle on a spherical surface is (approximately) elliptical. Moreover, because visible appearances lack depth, the elliptical visible figure would be flat; it would not be curved three-dimensionally. There is a resemblance and necessary connection between a visible figure and the external shape in such a way that the former, through mathematical reasoning, can be derived from the latter.

Reid thus claims that a blind man with the ability of mathematical reasoning would be able to derive the shape of a visible appearance from a given external shape, its distance, and its position. An intelligent blind man could mathematically deduce the shape of the projection of the external shape on a spherical surface, and understand that if he could see, the visible appearance would have that shape. Reid reports that 'Dr Saunderson understood the projection of the sphere'.[158] If Reid's account is right, Dr Saunderson was able to know, by mathematical reasoning, that

[156] Ibid., p. 70.
[157] Ibid., pp. 70-1.
[158] Ibid., p. 70.

the projection of a spherical object placed directly before the eye would have a circular shape, and thereby could understand that he would be given a circular visible figure if he could look at a sphere.[159]

Reid considers a case where a blind mathematician is made to see, and is visually presented with two-dimensional shapes.

> We have endeavoured to prove, that a blind man may form a notion of the visible extension and figure of bodies, from the relation it bears to their tangible extension and figure. Much more, when this visible extension and figure are presented with his eye, will he be able to compare them with tangible extension and figure, and to perceive, that the one has length and breadth as well as the other; that the one may be bounded by lines, either straight or curve, as well as the other. And therefore, he will perceive, that there may be visible as well as tangible circles, triangles, quadrilateral and multilateral figures.[160]

What Reid means by 'tangible figure' is an external shape suggested by sensations of touch. On Reid's account, if a blind mathematician is told what the external shape is and how it is located in relation to the eye, he could deduce the shape of the possible visible appearance by mathematical reasoning, i.e. by deducing the shape of the projection of the external shape on a spherical surface. So, the blind mathematician already understands that visible appearances are all two-dimensional, and so that they have the same shape as two-dimensional objects existing externally. Now, if the blind mathematician recovers from blindness, he would be actually given, say, a circular visible appearance. He would infer that the external shape before his eyes could be a circle, globe, or any other shape whose projection on a spherical surface

[159] Ibid., pp. 70-1.
[160] Ibid., pp. 248-9.

would be circular. At any rate, he would understand that the circular visible appearance actually given to him has the same shape as a circular object existing in the external world, if not before his eyes. The same would be true of triangular, quadrilateral, and multilateral visible appearances, whose shapes are the same as triangular, quadrilateral, and multilateral external (or 'tangible') objects existing in the external world. Two-dimensional visual appearances have the same shape as two-dimensional external objects, and this would be understood by a blind mathematician.

Reid admits that it is possible for a visible figure not to be the same as a corresponding two-dimensional shape in the external world. He imagines a case in which an eye is at the centre of a spherical room. A great circle dividing the room into two hemispheres is drawn inside the room. The projection of the great circle on the spherical surface of the retina would be a straight line lying on a spherical surface, and because visible appearances have no depth, the subject would be given a visible appearance which is simply linear and straight. Therefore, if there is a shape bounded by three great circles drawn inside the room, the visible figure would be a flat shape bounded by three straight lines i.e. a triangle. However, since it is the same shape as a projection on a spherical surface, the triangular visible figure, though flat, has the properties of a spherical triangle. Reid thus says that the sum of the interior angles of the triangular visible figure is greater than two right angles. The visible figure is a non-Euclidean triangle. If he is right, the same would be true even as to cases outside a spherical room, and as to visible figures which are not triangular.

Visible figures differ from the external shapes in that the former are non-Euclidean whereas latter are Euclidean.[161]

However, Reid maintains that when a visible figure is small, there is no difference between a visible figure and the external shape.

> … it is true, that of every visible triangle, the three angles are greater than two right angles; whereas in a plain triangle, the three angles are equal to two right angles: but when the visible triangle is small, its three angles will be so nearly equal to two right angles, that the sense cannot discern the difference.[162]

Reid holds that a small triangular visible figure is the same as an external triangle. When a visible figure is small to a certain extent, visual perception becomes insensitive to its non-Euclideanness, and simply delivers a Euclidean shape. We can ascribe to Reid the following phenomenological thesis.

(R*v*2) The large shapes delivered by visual perception are non-Euclidean.

Thus, Reid regards small visible figures as the same as the external shapes.

> Hence it appears, that small visible figures … have not only a resemblance to the plain tangible figures which have the same name, but are to all sense the same. So that if Dr Saunderson had been made to see, and had attentively viewed the figures of the first book of Euclid, he might, by thought and consideration, without touching them, have found out that they were the very figures he was before so well acquainted with by touch.[163]

Reid imagines Dr Saunderson recovering from blindness and being shown plane figures drawn in Euclid's book. Dr Saunderson would be given small visible figures,

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[161] Ibid., pp. 214-20; p. 249.
[162] Ibid., pp. 249-50.
[163] Ibid., p. 250.

which not only resemble, but are the same as flat shapes existing externally. Suppose that Dr Saunderson viewed a square and circle drawn on paper. The two visible figures given to him would be the same as the square and circle drawn on paper. He has had conceptions and beliefs of various external shapes by touch before. So, he could compare the two visible figures with various external shapes, and say that the visible figures are the same as a square and circle that have been suggested by sensations of touch. Dr Saunderson would then be able to correctly name the figures on paper. Reid would give a positive answer to the two-dimensional version of Molyneux's Question on the condition that the subject is capable of mathematical reasoning.

Notice that, for Reid, the sameness between a small visible figure and a corresponding plane external shape is *mathematical*. If Dr Saunderson said that the visible figure given to him is the same as an external circular shape that has been suggested by sensations of touch, what he means would be that the former and the latter are *mathematically* the same. We can see this from Reid's remark that Dr Saunderson would use 'thought and consideration'. In Reid's view, although Dr Saunderson has conceptions and beliefs of plane external shapes, the sameness in question would not be simply manifest to him.

Van Cleve interprets the sameness here in a different way. He refers to the following remark:

> … although the visible figure is coloured, and the tangible is not, they may, notwithstanding, have the same figure; as two objects of touch may have the same figure, although one is hot and the other cold.[164]

[164] Ibid., p. 249.

Reid says that a visible figure, which is coloured, and a tangible figure, which is not coloured, can have the same shape, just as a hot tangible object and a cold tangible object can have the same shape. According to Van Cleve's interpretation, this implies that even an ordinary blind person, if made to see, would be able to correctly name plane shapes before his eyes.[165] To understand Van Cleve's interpretation, let us imagine a person who has felt a hot square, but has never felt a cold square or any other cold shape. When he touches a cold square for the first time, he would presumably need no mathematical reasoning to judge that it is square. It is plausible that the sameness between a hot square and a cold square is underpinned not only by their mathematical properties but by a (non-mathematical) sensory quality; hot and cold squares simply feel the same. If there is this sort of sameness between a square visible figure and a square tangible figure, a square visible figure would simply seem the same as a square tangible figure to a newly sighted man. The newly sighted person could then call the visible figure a square without mathematical reasoning. On Van Cleve's interpretation, the sameness between a plane visible figure and a corresponding tangible figure is non-mathematical.

However, we should not ignore Reid's writing that Dr Saunderson would need to use 'thought and consideration'. Recall also Reid's supposition that Dr Saunderson 'has time to canvass [visible appearances], and to compare them, in his mind, with the notions which he formerly had by touch; and in particular to compare, in his mind, that visible extension which his eyes present, with the extension in length and breadth with which he was before acquainted'. Furthermore, I think that the following passage shows that our interpretation is correct:

[165] Van Cleve (2007), p. 20.

> … plane figures which are seen at one view, when their planes are not oblique, but direct to the eye, differ little from the visible figures which they present to the eye. The several lines in the tangible figure have very nearly the same proportion to each other as in the visible; and the angles of the one are very nearly, although not strictly and mathematically, equal to those of the other. Although therefore we have found many instances of natural signs which have no similitude to the things signified, this is not the case with regard to visible figure. It hath in all cases such a similitude to the thing signified by it, as a plan or profile hath to that which it represents; and in some cases the sign and thing signified have to all sense the same figure and the same proportions.[166]

Reid says that if plane external shapes are viewed head-on, they 'differ little' from, rather than the same as, the visible figures. For he considers cases where visible figures are not strictly Euclidean. When he writes later in the passage that the plane external shapes and the visible figures are the same 'in some cases', he has in mind cases of small visible figures. At any rate, in all cases, the 'similitude' or sameness here is mathematical. Reid talks of the 'similitude' or sameness of such mathematical properties as angles and proportions of lines. So, if Dr Saunderson looked at plane figures on paper, he would, 'by thought and consideration', compare the angles and the proportions of the lines that the visible figures have with those of the plane external shapes that have been suggested by sensations of touch. This would not be possible if a newly sighted subject has no mathematical knowledge.

Reid, after dealing with plane shapes, returns to the case of three-dimensional shapes. He repeats that a visible figure differs from the external shape when the

[166] Reid (1785), pp. 220-1

external shape is three-dimensional, because 'visible extension hath not three, but two dimensions only'.[167] However, he, this time, adds as follows:

> Yet as it cannot be said that an exact picture of a man hath no resemblance of the man, or that a perspective view of a house hath no resemblance of the house; so it cannot be said, with any propriety, that the visible figure of a man, or of a house, hath no resemblance of the objects which they represent.[168]

For Reid, as we have seen, a visible figure is the same as the shape of a projection of the external shape on a sphere. So, when there is a cube before the eyes, for example, a visible figure would be two-dimensional. But this, on Reid's view, would not make it impossible for the visible figure to resemble a cube. Rather, a visible appearance of a cube, despite its two-dimensionality, retains a resemblance to the external cube.

We should note that the resemblance here consists in a mathematical relation. A picture of a man differs from the man in that the picture is two-dimensional. Yet it resembles the man if it depicts a projected image of the man. For Reid, that the picture resembles the man means that there is a mathematical relation of projection between them. Reid would say that if there is not a mathematical relation of projection between a picture and the external object, the picture has no resemblance to the external object. A 'perspective view' of a house differs from the house because the shape of the house itself is obviously not 'perspectival'. However, Reid would say that a 'perspectival view' is mathematically derivable from the real shape of the house and its location in relation to the eye. As the way Reid chooses his examples shows, he means by a 'resemblance' a mathematical relation of projection.

Reid would endorse the following phenomenological thesis:

[167] Ibid., p. 250.
[168] Ibid., pp. 250-1.

(R*v*3) The shapes as seen have mathematical properties (as external shapes do).

The shapes as seen have mathematical properties such that they are the same as the projections of the external shapes, and that they are the same as the plane external properties.

Reid does not discuss a case where Dr Saunderson, having made to see, is presented with a cube and a globe. His treatment of the case would be as follows. If Dr Saunderson looked at a cube and a globe, he would be a given two plane visible figures, one being polygonal and the other being circular. Although he could mathematically deduce a visible figure from a given external shape, he could not perform the reverse task – i.e. the task to deduce a three-dimensional external shape from a given plane visible figure. If a given visible figure is a polygonal shape which could result from projection of a cube, the external shape might be a cube, but might also be a different cuboid, parallelepiped, etc. If a given visible figure is circular, the external shape might be a globe, cone (whose vertex is pointing to the eyes), and so on. So, Dr Saunderson, given circular and polygonal visible figures, could not say with certainty what the external shapes are. As pointed out by Van Cleve, Reid would hold that Dr Saunderson could name the shapes before him if he is given the Leibniz hint.[169] If Dr Saunderson was informed that the shapes in front of him are a cube and a globe, he could mathematically derive the shapes of visible appearances by deriving two-dimensional projections of a cube and a globe. He could then compare the two visible figures that he is given through sight with the mathematically derived shapes, and say which visible figure corresponds to a cube, and which corresponds to a globe. (Robert Hopkins also rightly points out that Dr

[169] Van Cleve (2007), p. 18.

Saunderson's 'success depends on his being asked to identify objects from a strictly limited set'.[170]) Hence, Reid would give a positive answer to Molyneux's Question on the conditions that the newly sighted subject knows mathematics, and that the subject is given the Leibniz hint.

5. Conclusion

Through considering how Reid deals with his thought experiments with an ordinary blind person and a blind mathematician, and how he would answer Molyneux's Question, I have clarified his phenomenological view as to shape perception. In Reid's view, tactile perception delivers no shape. Concerning the visual perception, he thinks that it delivers flat shapes which have mathematical properties. He also thinks that large shapes delivered by visual perception have non-Euclidean properties.

The phenomenological theses particularly relevant to our inquiry are (R*v*1). The thesis (R*v*1), that the shapes as seen are flat, would support the argument for (C5) by endorsing the claim (C2). The thesis (R*v*1) is the same as Locke's thesis (L*v*). However, whereas Locke holds (L*v*) simply by describing the visual phenomenology, Reid gives the reason that visual perception does not deliver depth. It is, in fact, Berkeley's reason for holding (B*v*1) that the shapes as seen are neither flat nor solid. Reid, for the same reason, puts forward the phenomenological thesis held by Locke rather than Berkeley.

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[170] Hopkins (2005), p. 351.

Chapter 5:

Kant

In this chapter, I shall present Kant's view of the perceptual phenomenology. His view is that the perceptual phenomenology of space is bound to be *three-dimensional* and *Euclidean*. This, unlike the phenomenological views we have seen, is not a description of the actual phenomenology. Rather, Kant's view states the constraints on all possible cases of the perceptual phenomenology. That is, it states that space as perceived in any possible case would have to be three-dimensional and Euclidean. It naturally implies that the actual phenomenology of space is three-dimensional and Euclidean. It would in turn follow that the objects as seen and the objects as felt have up to three dimensions. Thus, if Kant's phenomenological view is right, there would be no threat of the argument for (C5). For it would support the claim (C1) that the description of the objects as tactilely perceived mentions flat and solid shapes, but would deny the claim (C2) that the description of the objects as visually perceived mentions no solid object. Although all the philosophers we have hitherto discussed think that no solid shape is delivered by visual perception, Kant would hold that visual perception does deliver solid shapes.[171] Moreover, Kant's view would guarantee that both the description of the objects as seen and that of the objects as

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[171] In Kant's system, physical objects are both three-dimensional and Euclidean *because* perception delivers us three-dimensional, Euclidean objects. For him, the geometrical properties delivered by perception *are* those in the physical world. This tenet by itself would also be sufficient for rejecting (C5). For it entails that by describing the geometrical properties delivered by visual perception, we describe only the physical properties. However, we shall deal with Kant's phenomenological view by separating it from his tenet that shapes as perceived are physical shapes.

felt mention Euclidean properties but no non-Euclidean properties. (So we might be able to criticise Reid's thesis (R*v*2), that the large shapes delivered by visual perception are non-Euclidean, by pursuing Kant's account.) However, for all the benefits of Kant's phenomenological view, my purpose is not to clarify and adopt it. The aim of this chapter is to provide a preliminary for the pursuit of Reichenbach's alternative account, which stems from a criticism of Kant's view.

Kant's view of the perceptual phenomenology consists of two separate claims – that space as perceived has to be three-dimensional, and that it has to be Euclidean. The claim that space as perceived has to be three-dimensional is independent of the claim that it has to be Euclidean, and vice versa. For example, one could hold that space as perceived has to be two-dimensional, while acknowledging that it has to be Euclidean; the position would be that space as perceived has to conform to two-dimensional Euclidean geometry. Or one could hold that space as perceived has to be three-dimensional, while denying that it has to be Euclidean. When I deal with the claim that the phenomenology of space is bound to be Euclidean, two Euclidean axioms will be relevant. One is the axiom that exactly one straight line can be drawn between two points, and the other is the axiom known as Euclid's 'fifth postulate' or the 'parallel postulate', which is to the effect that through a point lying outside a given straight line, there is exactly one line parallel to that given line.[172] If Kant is right, we cannot have perception as of objects violating such Euclidean axioms.

[172] The other three axioms as presented by Euclid are: that a finite straight line can be continuously drawn in a straight line, that a circle can be drawn with any centre and distance (together forming a radius), and that all right angles are equal to one another (Euclid (1956), p. 154).

1. Sassen's interpretation: Kant and Cheselden's report

In clarifying Kant's view of the perceptual phenomenology, I will criticise Brigitte Sassen's interpretation. Sassen refuses to attribute to Kant the view that space as perceived is bound to be three-dimensional and Euclidean. The disagreement between my interpretation and Sassen's arises from the issue as to how Kant would answer Molyneux's Question. Kant does not discuss or even mention Molyneux's Question. Sassen raises a question why he does not. Before Kant wrote the *Critique of Pure Reason*, Cheselden had reported cataract removal operations, which were widely known in Kant's time. Cheselden's full report is of a man who lost sight at an early age, and has no memory of having seen.[173] Before the operation, the man could tell day from night, and could recognise black, white, and scarlet in most cases with a strong light. But he could not 'perceive the shape of any thing'.[174] When the patient could first see after the operation, 'he knew not the shape of any thing, nor any one thing from another, however different in shape, or magnitude'.[175] Thus Cheselden's report supported a negative answer to Molyneux's Question. Cheselden's empirical evidence, Sassen says, would be incompatible with the Transcendental Aesthetic of the *Critique* (in which Kant discusses intuition of space and time) if it is read as holding intuition of space to be within us prior to all perceptual experiences. For this reading, which Sassen calls the 'temporal-psychological reading' (hereafter the 'nativist reading'), would draw from the Transcendental Aesthetic a positive answer to Molyneux's Question. On the nativist reading, Kant's view is that we are equipped with a geometrical scheme prior to any perceptual experience – that we, in some sense, have space and its geometry within

[173] See Morgan (1977), pp. 16-7.
[174] Cheselden (1977), p. 19.
[175] Ibid.

us before perception. Sassen admits, without a detailed argument (which I shall develop later), that this view would entail homogeneity of spatial perception between sight and touch, and so would entail a positive answer to Molyneux's Question. This reading would then make it problematic that Kant omitted a response to Molyneux's Question, for his positive answer would have gone against the empirical evidence already known in his time.[176]

Sassen aims to remove the apparent tension between the Transcendental Aesthetic and Cheselden's report. She insists that the above version of a nativist interpretation is wrong, because space, for Kant, is 'not a concept, but a (form of) intuition'.[177] Sassen does not intend to reject the nativist reading altogether, but rejects the version of it which construes intuition as involving geometry prior to perception. She seems to exclude any grasp of geometry from Kant's intuition of space, classifying geometry as conceptual as opposed to intuitive. She thus proposes the 'epistemic reading', on which the Transcendental Aesthetic deals not with space and its geometry we possess within us before perception, but with the way spatial perception has to be. In other words, on Sassen's 'epistemic reading', Kant is interested in the conditions of possible spatial perception.

Sassen discusses two conditions on Kant's behalf. First, Kant writes that 'in order for certain sensations to be related to something outside me (i.e., to something in another place in space from that in which I find myself), thus in order for me to represent them as outside <and next to> one another, thus not merely as different but as in different places, the representation of space must already be their ground'.[178] For Kant, that sensations are represented as located outside me entails that they are

[176] Sassen (2004).
[177] Ibid., p. 473.
[178] Kant (1998), p. 175 (A 23 / B 38).

represented as next to one another. Sassen says that this thought can be applied to a case of having both visual and tactile perceptions, the outcome being that the objects of sight and the objects of touch have to be represented as placed next to one another in some way. However, Sassen holds, this does not imply that the arrangement of the objects of sight and that of the objects of touch are represented as 'isomorphic'.[179] She says that 'there is simply no guarantee that the visual representation of a globe or a cube equals the tangible one, or that it could be immediately recognized (constructed) by the newly sighted person'.[180] It is one thing for points on the object as visually experienced to be spatially related to points on the object as tactilely experienced in a particular way, but it is quite another for the objects as seen and as felt to be structured by their points in the same manner. (John Campbell (1989) criticises Evans by referring to empirical evidence suggesting that location recognition can be without shape recognition, and vice versa. The capacity for identifying egocentric locations could be separate from that for recognising shapes. Then, even if Evans is right in holding that the former is amodal, it would not follow that the latter also is. Campbell's argument shows us one way to understand Kant's account as interpreted by Sassen here. A subject has to recognise all positions, whether visible or tangible, as related to one another in a particular manner, but this has no implication as to what shapes the subject recognises, or even whether she recognises any shape at all.) Second, Kant maintains that 'one can only represent a single space', and that space 'is essentially one'.[181] On Sassen's interpretation, this claim implies that we are bound to be intuitively certain that visual and tactile sensations can be found in a single space. However, she holds, that we have to seek

[179] Sassen (2004), p. 480.
[180] Ibid., p. 480.
[181] Kant (1998), p. 175 (A 25 / B 39).

unity of space in having visual and tactile experiences entails neither that we actually find unity, nor that the experiences are isomorphic (from the subjective viewpoint). The Transcendental Aesthetic, thus, does not entail a consequence as to whether possible spatial experience is isomorphic across sight and touch, and so would not commit Kant to a positive answer to Molyneux's Question. The idea is to eliminate the *prima facie* conflict between the Transcendental Aesthetic and Cheselden's case by arguing that Kant could allow a negative answer.

I will not object to Sassen's attributing to Kant the claim that locations have to be represented as next to each other, and the claim that we can represent only one space. Nor will I object to Sassen's application of these claims to a cross-modal case. My interpretation, however, is incompatible with Sassen's, because I will include the geometrical constraints, i.e. three-dimensionality and Euclideanness, in Kant's 'intuition'. I will pursue the version of the 'nativist reading' that Sassen rejects, defending it against her claim that geometry, for Kant, is not intuitive but conceptual. I will also argue that to incorporate geometrical constraints into intuition would also be coherent with the 'epistemic reading'. Sassen denies that Kant takes space and its geometry as what we have within us prior to perception, and goes on to adopt the 'epistemic reading', according to which Kant's talks of the conditions of possible experience of space. However, if I was to adopt the 'epistemic reading', I would regard three-dimensionality and Euclideanness as included in the conditions of possible experience. That is, even if we adopt the 'epistemic reading', Kant should be interpreted to hold that space as perceived is bound to be three-dimensional and Euclidean. (Indeed, as we shall see in the next chapter, P. F. Strawson, whose interpretation Sassen regards as 'epistemic', takes spatial perception to have a geometrical constraint.)

I will argue that Kant, on my 'nativist reading', would allow a positive answer to Molyneux's Question, without being compelled to give that answer. On my 'epistemic reading', too, Kant would allow a positive answer to Molyneux's Question, but would also allow a negative answer. Therefore, there is no conflict between the Transcendental Aesthetic and Cheselden's case which Sassen should resolve with her interpretation.

2. Kant and Molyneux's Question

On my interpretation, Kant holds that perception of space depends upon pure intuition, which contains geometrical rules. To understand the relation between perception and pure intuition, let us begin with his thesis that geometrical knowledge is synthetic *a priori*.

> Geometry is a science that determines the properties of space synthetically and yet *a priori*. What then must the representation of space be for such a cognition of it to be possible? It must originally be intuition; for from a mere concept no propositions can be drawn that go beyond the concept, which, however, happens in geometry … . But this intuition must be encountered in us *a priori*, i.e., prior to all perception of an object, thus it must be pure, not empirical intuition. For geometrical propositions are all apodictic, i.e., combined with consciousness of their necessity, e.g., space has only three dimensions; but such propositions cannot be empirical or judgements of experience, nor inferred from them … .[182]

Kant's example of a geometrical proposition in this passage is that space has three dimensions. In an earlier section of the Transcendental Aesthetics, Kant mentions the

[182] Ibid., p. 176 (A 25 / B 40-1).

proposition that two sides of a triangle together are greater than the third.[183] In the first edition of the *Critique*, he mentions the proposition that only one straight line can lie between two points.[184] For Kant, these geometrical propositions, though not analytic, are known *a priori*. For example, we know that there can be only one straight line between two points though encountering 'pure intuition', prior to any perception of objects.

In the above passage, Kant rephrases '*a priori*' as 'prior to all perception of an object'. This suggests that Kant regards 'perception' as that which only delivers empirical knowledge. We can see this more clearly in the following remark:

> Space and time are its pure forms, sensation in general its matter. We can cognize only the former *a priori*, i.e., prior to all actual perception, and they are therefore called pure intuition; the latter, however, is that in our cognition that is responsible for it being called *a posteriori* cognition, i.e., empirical intuition.[185]

Space is a 'form' of pure intuition, which is cognised prior to perception. This cognition yields (synthetic) geometrical propositions, and that is why they are *a priori*. In contrast, sensation is a 'matter' of space which Kant calls '*a posteriori* cognition' or 'empirical intuition'. We can thus say that perception through senses, for Kant, pertains to cognition of empirical knowledge. His contrast between pure intuition and empirical intuition (or perception) corresponds to that between *a priori* and *a posteriori* knowledge.

What does Kant mean when he says that pure intuition is 'encountered' or 'cognized' *a priori* such that geometrical knowledge is derived from it? Kant has a

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183 Ibid., p. 175 (A 25 / B 39).
184 Ibid., p. 158 (A 24).
185 Ibid., p. 185 (A 42 / B 60).

clear answer outside the Transcendental Aesthetic.

> **Philosophical** cognition is **rational cognition** from **concepts**, mathematical cognition that from the **construction** of concepts. But to **construct** a concept means to exhibit *a priori* the intuition corresponding to it. For the construction of a concept, therefore, a **non-empirical** intuition is required, which consequently, as intuition, is an **individual** object, but that must nevertheless, as the construction of a concept (of a general representation), express in the representation universal validity for all possible intuitions that belong under the same concept. Thus I construct a triangle by exhibiting an object corresponding to this concept, either through mere imagination, in pure intuition, or on paper, in empirical intuition, but in both cases completely *a priori*, without having had to borrow the pattern for it from any experience. The individual drawn figure is empirical, and nevertheless serves to express the concept without damage to its universality, for in the case of this empirical intuition we have taken account only of the action of constructing the concept, to which many determinations, e.g., those of the magnitude of the sides and the angles, are entirely indifferent, and thus we have abstracted from these differences, which do not alter the concept of the triangle.[186]

According to Kant, we obtain geometrical knowledge not by merely reflecting a concept, but by 'constructing' a concept. A geometrical concept can be constructed either in pure intuition or in empirical intuition – that is, either in imagination or on paper.[187] If we are only given the concept of a triangle, Kant argues, we will never come to know the sum of the interior angles of the shape. For we can only reflect on

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[186] Ibid., p. 630 (A 713-4 / B 741-2). See also ibid., pp. 631-3 (A 714-8 / B 742-6).

[187] For Kant, although imagination involves sensation, it is something the subject can have prior to any perceptual experience, and is therefore *a priori*. He writes: 'Imagination is the faculty for representing an object even without its presence in intuition. Now since all of our intuition is sensible, the imagination … belongs to sensibility … . Imagination is … a faculty for determining the sensibility *a priori* …' (ibid., pp. 256-7 (B151-2)).

a concept of a shape having three straight sides and three angles. Kant even thinks that we will come to know nothing new by this method. However, if we *construct* the concept by imagining or drawing a triangle, then we can derive from the construction the proposition that a triangle has interior angles whose sum is equal to two right angles.[188] (It is a consequence of Euclid's 'fifth postulate' that the sum of the interior angles of a triangle is equal to two right angels.) What plays the essential role here is pure intuition rather than empirical intuition. Kant writes that a non-empirical intuition is required to construct a concept. When we draw a triangle on paper, the triangle is given to perception but not to imagination. Nevertheless, we can derive from it a synthetic *a priori* proposition, because, in virtue of pure intuition, it is possible for us to only consider the 'action of constructing the concept' of a triangle.

It should be clear now that Sassen is wrong in excluding geometry from intuition of space for the reason that geometry is conceptual. Kant explicitly says that pure intuition is required for constructing a concept, i.e. for imagining or drawing a figure from which we can derive geometrical knowledge. He also argues that reflection on a concept of shape alone cannot yield any Euclidean proposition. For Kant, Euclidean geometry consists in pure intuition rather than in concepts. Therefore, whether one adopts the nativist reading or epistemic reading, one has to construe intuition of space as involving geometry.

Now, let us suppose Kant is right in maintaining that we obtain synthetic *a priori* geometrical propositions from pure intuition, i.e. from figures we imagine or draw on paper. Why, then, are those propositions, derived from particular imagined or drawn shapes, generally true of shapes that could be delivered by perception? To

[188] Ibid., pp. 631-2 (A716 / B 744).

use Kant's terms, why can he hold that an 'individual object' for which pure intuition is required must 'express' its validity for 'all possible intuitions' (including all possible empirical intuitions)? Below is his general account of the relationship between pure intuition and empirical intuition:

> Empirical intuition is possible only through the pure intuition (of space and time); what geometry says about the latter is therefore undeniably valid of the former, and evasions, as if objects of the senses did not have to be in agreement with the rules of construction in space (e.g., the rules of the infinite divisibility of lines and angles), must cease. For one would thereby deny all objective validity to space, and with it at the same time to all mathematics, and would no longer know why and how far they are to be applied to appearances.[189]

Kant criticises the claim that things as perceived can evade the geometrical laws derived from pure intuition. In his view, geometrical rules derived from pure intuition of space have to be true of objects as perceptually experienced, because any empirical intuition of space is 'possible only through' pure intuition of space. Whenever we perceive space, our spatial perception is dependent upon pure intuition. So, for example, if pure intuition yields the proposition that there can be exactly one straight line between two points, then the proposition must be true of points and straight lines as actually perceived.

Kant's idea of the dependence of empirical intuition of space upon pure intuition is a reiteration of his thesis that space (as pure intuition) is a form of outer sense.

> Space is nothing other than merely the form of all appearances of outer sense, i.e., the subjective condition of sensibility, under which alone outer intuition is possible for us.

[189] Ibid., p. 289 (A 165 / B 206).

> Now since the receptivity of the subject to be affected by objects necessarily precedes all intuitions of these objects, it can be understood how the form of all appearances can be given in the mind prior to all actual perceptions, thus *a priori*, and how as a pure intuition, in which all objects must be determined, it can contain principles of their relations prior to all experience.[190]

For Kant, pure intuition of space exists prior to 'all actual perceptions', imposing a condition on all objects phenomenally given to us through perception. As we have seen, he also holds that sensation is 'matter' whereas space is a 'form'. He would explain that sensations, or objects as delivered by perception, depend on pure intuition in the way that matter cannot exist without given a form. The form of outer sense, i.e. space as pure intuition, contains geometrical rules. They exist prior to perception, and are the condition for all objects that could be delivered through perception.[191] This is why, Kant would hold, geometrical propositions derived from particular imagined or drawn shapes are generally true of shapes as perceptually experienced.[192]

We are now ready to see how Kant might allow a positive answer to Molyneux's Question. The shapes as visually perceived and the shapes as tactilely perceived, for Kant, cannot completely fail to be isomorphic. Perception, whether visual or tactile, is 'possible only through the pure intuition', which contains three-dimensional and Euclidean constraints. Let us suppose that when Molyneux's man

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[190] Ibid., p. 159 (A26 / B42).

[191] See also ibid., p. 158 (A24/ B 39).

[192] We can now see that Kant's phenomenological view differs from Leibniz's. Although Leibniz takes geometrical ideas to be Euclidean (and perhaps limited to three dimensions), he thinks that, as it were, the phenomenology is completely independent of ideas. In Leibniz's view, geometrical 'ideas' puts no constraint on the phenomenology. Furthermore, it would never be the case that the phenomenology 'expresses' geometrical 'ideas' such that geometrical knowledge is derivable from it. For Leibniz, geometrical 'ideas' are only *applied* to the phenomenology.

begins to see, the two objects and their parts which we would call a 'line', 'vertex', etc. seem entirely unfamiliar to him (for some reason), and so that he cannot immediately say what shapes are delivered by visual perception simply by the way the shapes as seen are. Even on this supposition, Kant could allow a positive answer to Molyneux's Question. Because Kant thinks that space as perceived is bound to be three-dimensional, he would acknowledge that the subject's new perception would deliver two solid shapes. (The three-dimensionality would be intuited by sight, so it would not be that the subject needs to apply the concept of three-dimensionality to the new perception.) When Molyneux's subject looks at the cube, the visual phenomenology would be such that there is a three-dimensional object consisting of parts which we would call 'square sides'. Having visual experience as of what we would call 'square sides', the subject could apply a Euclidean proposition to the parts as visually perceived, for the parts as seen would have to be Euclidean. Suppose that the phenomenology of looking at Figure 1 is the phenomenology of looking at a cube. (The phenomenology, for Kant, is three-dimensional.) Molyneux's subject could tentatively take *A* and *B* to be 'points', and *a* to be a 'straight line'. He could then come to know, using his imagination (or his ability of 'construction'), that there can never be another part congruent with *a* located between *A* and *B*. Thus, the newly sighted man could know that the Euclidean proposition that there can be only one straight line between two points is applicable to *A*, *B*, and *a* by calling *A* and *B* 'points' and *a* a 'straight-line segment'. If he goes on to notice that the part in question has four equal 'straight-line segments' meeting each other at their 'end points' to form four equal angles, he would find it sufficient for the part as seen to be called a 'square'.[193] Because the shape as seen consists only of such a part, the newly

[193] Kant would acknowledge that equality, or congruence, of right angles is intuited.

sighted man could call the solid shape delivered by visual perception a ‘cube’.[194] Let us turn to the case of a globe. Suppose that the phenomenology of looking at Figure 2 is that of looking at a globe (which Kant would say is three-dimensional). When the subject looks at the globe, the shape as seen has no part to which the Euclidean proposition he has just used is applicable. Perhaps he could attempt to apply the proposition to what we would call a line-segment on the surface of a globe. However, he could realise that he cannot not call *b* a ‘straight-line segment’ by regarding *D* and *C* as ‘points’. For he could know, by imagination or ‘construction’, that there can be a part congruent with *b* (shown in the figure as *c*) between *D* and *C* (in addition to *b* itself). The proposition that there can be only one straight line between two points is not applicable to *D*, *C*, and *b*. I will not fully discuss whether the subject could name the shape as seen a ‘globe’ by using Euclidean propositions, but he could at least take it to be bounded by a curved surface which has no straight part.

Figure 1

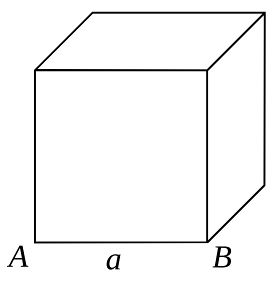
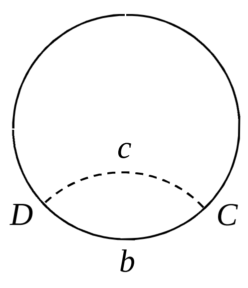


Figure 2



Since one of Euclid’s axioms (or, in Euclid’s term, postulates) is that all right angles are equal, Kant would hold that this axiom is also contained in pure intuition.

[194] Because the newly sighted subject would not have visual experience as of six square sides, some sides occluded by others, he might say, for example, that there are three squares attached with each other three-dimensionally. To endorse this outcome, I think, would be to allow a positive answer to Molyneux’s Question rather than a negative one. Or, if the cube is framed with wire, it would be that Molyneux’s subject could say that the shape as seen is a solid shape consisting of six sides.

Kant would acknowledge that Molyneux's subject could use the above method successfully provided that he already knows geometrical propositions. The subject, however, might not have been taught geometry, or derived it from pure intuition by himself. Moreover, even if the newly sighted subject already knows geometry, he might not come to think of using the above means – that is, he might not come to apply geometrical propositions to the two shapes delivered by visual perception (with the aid of imagination). The subject might not fully use the faculty and the perception available to him. Thus, I think that Kant would not be committed to a positive answer although he would allow it.

As we have discussed, Sassen is wrong in excluding geometry from Kant's 'intuition' by considering geometry conceptual and non-intuitive. Even on the 'epistemic reading', space as perceptually experienced, for Kant, would have to be three-dimensional and Euclidean. That is, three-dimensionality and Euclideanness would be the conditions of possible perceptual experiences. This version of 'epistemic reading' is compatible with Sassen's treatment of the conditions pertaining to spatial locations and unity of space. However, it would deny her conclusion that the shapes as seen and the shapes as felt, for Kant, need not be isomorphic. The geometrical condition we would add to the 'epistemic reading' entails that the two shapes as visually perceived by Molyneux's subject would be isomorphic with the shapes as felt to the extent that they are three-dimensional and Euclidean. On the 'epistemic reading', however, intuition would not provide the newly sighted man with the grounds for imagination from which he could derive geometrical knowledge even before perception. So, to allow a positive answer to Molyneux's Question, Kant would need to suppose that Molyneux's man has learned geometry (perhaps using the sense of touch). But even if Kant makes this supposition, Molyneux's subject might not come to think of applying geometrical propositions to the shapes as seen. Hence, even on the version of the 'epistemic reading' Sassen rejects, Kant would not be committed to a positive answer to Molyneux's Question.

Thus, Kant's view is that there are three-dimensional and Euclidean constraints on the perceptual phenomenology. This view would provide him a way to allow a positive answer to Molyneux's Question. However, it would not follow that he is compelled to give a positive answer; he could still allow a negative answer. This would be so whether we adopt the 'nativist reading' or the 'epistemic reading'. So, we can attribute the view to Kant without worrying about making the Transcendental Aesthetic coherent with Cheselden's report.

Chapter 6:

Reichenbach

We have presented Kant's tenet that the perceptual phenomenology is bound to be three-dimensional and Euclidean. In this chapter, I will examine accounts offered by Strawson and Frege, who are in favour of the view that the perceptual phenomenology has to conform to Euclidean geometry. We will see that their explanations are inadequate, and that there is no cogent defence of the Kantian view of the Euclideanness of perception. The difficulty is to show not only that the phenomenology is actually Euclidean, but that it is *restricted* to be Euclidean. I will then discuss an alternative position offered by Reichenbach. His view is that we can assume the visual phenomenology to be both Euclidean and non-Euclidean. This follows from his phenomenological account that the visual phenomenology involves no congruence. I will separate this account from his empiricist account, and defend it against James Hopkins' criticism. The aim of this chapter is to present Reichenbach's phenomenological view as a tenable option. (We will develop it in order to respond to the argument for (C5) in the final chapter.)

1. Strawson's Euclideanism of perception

Strawson, in *The Bounds of Sense*, endorses Kant's thought that space as perceptually experienced has to be *Euclidean*. In Strawson's view, both imagination and perception provide us with 'phenomenal figures'. The idea is that shapes as imagined and shapes as perceived, insofar as they are phenomenally present to the subject, both have to conform to Euclidean geometry. Strawson argues from an example.

> Consider the proposition that not more than one straight line can be drawn between two points. The natural way to satisfy ourselves of the truth of this axiom of phenomenal geometry is to consider an actual or imagined figure. When we do this, it becomes evident that we cannot, either in imagination or on paper, give ourselves a picture such that we are prepared to say of it both that it shows two distinct straight lines and that it shows both these lines as drawn through the same points.[195]

Strawson holds that we can neither imagine two lines between two points, nor draw such a figure on paper to have perception as of two straight lines lying between two points. His conclusion from this example is that shapes as imagined or perceived are bound to be Euclidean.[196]

Strawson's view implies that objects as perceived can never be non-Euclidean. For example, it is not only that we do not actually have perceptual experience as of two (or more) straight lines between two points, but also that we *can never* have such experience. Strawson's view concerns possible perceptions as well as actual ones. In other words, it concerns the *general constraints* on the phenomenology, rather than the actual state of it. According to Strawson, if we have perception as of two points and a straight line drawn between them, it is 'evident' that we cannot have perception as of two points between which are two straight lines. A question would be: how does the fact which goes beyond the actual experience become 'evident' when having the actual perception? Strawson's explanation is that the axiom is made true by the 'picturable meanings' of the expressions it contains, and so is

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[195] Strawson (1966), p. 283.

[196] Strawson says that he does not use, as Kant does, the word 'phenomenal' to mean 'physical'. This does not affect his agreement with Kant's phenomenological claim that things as perceived are Euclidean.

‘phenomenally analytic’.[197] To see what he means by this, let us look at the way Strawson explains the truth of Euclid’s assumption which is not derivable from Euclid’s preliminary propositions.

> … in the first problem in Euclid’s Elements it is assumed that a circle which has its radius equal to a given straight line, and its centre the point terminating that line at one end, *intersects* with the circle with the same radius whose centre is the point terminating the given straight line at its other end. This assumption is not justified by any appeal to an explicitly stated postulate, definition, or axiom. But we cannot picture to ourselves any figure which we should be prepared to count as adequate to the sense of the rest of the above description, for which this assumption does not hold. The picture of the sense of the description rules out any alternative to this assumption.[198]

It is impossible for us to imagine or to draw a figure consisting of two circles sharing a radius but not their centres, without making them intersect each other. For Strawson, this means that a denial of the assumption in question lacks what he calls a phenomenal or picturable meaning. Euclid’s assumption is ‘phenomenally analytic’, its negation being phenomenally meaningless. What Strawson really does here is to explain the constraints on figures as imagined or perceived in terms of *our inability to imagine or to draw a certain figure*. To return to the axiom that there can be only one straight line between two points, it is ‘evident’ that it is generally true of figures as imagined or perceived, because we are unable to imagine or to draw two points and two (or more) straight lines between them.

In my view, however, Strawson’s explanation at best shows our inability to imagine or to draw certain figures. It might be true that we are unable to imagine or

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[197] Ibid., pp. 283-4.
[198] Ibid., p. 284.

to draw two straight lines lying between the same two points. But this does not entail that there cannot be perception as of such a figure. Our inability to imagine or to draw a certain figure does not entail the existence of constraints on the perceptual phenomenology. It is possible that, after failed attempts to imagine or to draw a certain figure, one is shown the correct figure drawn on paper. Strawson insists that a geometry derived from imagination, though possible without perception, 'will not be without relation to' objects as perceptually experienced, his reason being that both imagination and perception present us with phenomenal figures.[199] However, that there are (Euclidean) constraints on imagination of shape would not prove that there is the same constraint on shapes as perceived; it is possible that the geometry of phenomenal figures produced by imagination has nothing to do with those delivered by perception. Why does the constraint on our imagination also have to be the constraint on perception?[200]

One might defend Strawson by arguing that the geometry of imagination 'will not be without relation to' things as perceived because our imagination is derived from perception, and the scope of what we can imagine is restricted by the perceptual phenomenology. According to this argument, our imagination is constrained by the Euclidean laws because perception is. Suppose it is true that we can only imagine shapes that are delivered by perception (and perhaps different combinations of them). Then it would be plausible that we can only imagine Euclidean shapes because we have only had perception as of Euclidean shapes. Yet it would not follow that we can never have perception as of non-Euclidean shapes. It

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[199] Ibid., p. 282

[200] Strawson does not think that Euclidean geometry is derivable only from the limitation of imagination (ibid., pp. 290-1). But his view is still that objects as imagined and perceived are bound to be Euclidean.

would rather follow that if we begin to have perceptual experience as of non-Euclidean shapes, then we would become able to imagine them.

The central problem is as follows. In order to claim that there are Euclidean constraints on the perceptual phenomenology, one needs more than the actual phenomenology to appeal to. For the claim concerns not only the perception we actually have but perceptions we could have. Strawson appeals to our inability to imagine or to draw certain figures, but leaves unexplained its connection to the putative limit to all possible perceptions. The question is: why should we think that objects as perceived are generally Euclidean?

2. Frege's Euclideanism of perception

Frege also holds the Kantian view that objects as perceptually experienced are restricted to be Euclidean.

> Empirical propositions hold good of what is physically and psychologically actual, the truths of geometry govern all that is spatially intuitable, whether actual or product of our fancy. The wildest versions of delirium, the boldest inventions of legend and poetry, where animals speak and stars stand still, … , where the drowning haul themselves up out of swamps by their own topknots – all these remain, so long as they remain intuitable, still subject to the axioms of geometry.[201]

By 'geometry' in the above passage, Frege means Euclidean geometry. Borrowing the term 'intuition' from the Transcendental Aesthetic, Frege characterises it as connected to 'sensibility'.[202] He is adopting the Kantian view which is also supported by Strawson – that spatial objects as (actually) perceived, those as

[201] Frege (1953), § 14, p. 20e.
[202] Ibid., § 12, p. 19e.

hallucinated, and those as pictured in the mind, insofar as they are sensorily or phenomenally present to us, conform to Euclidean geometry. Frege's reason for this endorsement seems to be the same as Strawson's. Frege goes on to write:

> Conceptual thought alone can after a fashion shake off this yoke, when it assumes, say, a space of four dimensions or positive curvature. To study such conceptions is not useless by any means; but it is to leave the ground of intuition entirely behind. If we do make use of intuition even here, as an aid, it is still the same old intuition of Euclidean space, the only space of which we have any picture. Only then the intuition is not taken at its face value, but as symbolic of something else; for example, we call straight or plane what we actually intuite as curved. For purposes of conceptual thought we can always assume the contrary of some one or other of the geometrical axioms, without involving ourselves in any self-contradictions when we proceed to our deductions, despite the conflict between our assumptions and our intuition. The fact that this is possible shows that the axioms of geometry are independent of one another and of the primitive laws of logic, and consequently are synthetic.[203]

Concepts allow us to conceive of a situation where a Euclidean axiom is false. For example, we can conceptually think of two straight lines lying between the same two points. The non-Euclidean proposition that there can be two straight lines between two points is not contradictory; it goes against neither the logical laws, nor the concepts of a 'straight line', 'between', and a 'point'. Yet it does go against our intuition. We cannot form, either in imagination or on paper, a picture of two straight lines lying between the same two points. If we are told to imagine or to draw such a figure, perhaps 'as an aid' to studying non-Euclidean geometry, we cannot but make one of the two lines curved, calling it a straight line. Thus, Frege's account is, as in

[203] Ibid., § 14, pp. 20e-21e.

the case of Strawson, based on an appeal to our inability to imagine or to draw non-Euclidean figures.[204] (We can see from the above passage that Frege also takes space as imagined or perceived as bound to have three dimensions. Frege says that we can only conceptually think of a four-dimensional space, the implication being that we can neither imagine nor have perception as of a four-dimensional space.)

Then, the problem which I have posed to Strawson arises again. Our inability to imagine or to draw a certain picture as such would not prove that there cannot be a perception as of that picture. How could Frege show that there are Euclidean constraints on perception (as well as on imagination)? He writes as follows earlier in the same section:

> One geometrical point, considered by itself, cannot be distinguished in any way from any other; the same applies to lines and planes. Only when several points, or lines or planes, are included together in a single intuition, do we distinguish between them. In geometry, therefore, it is quite intelligible that general propositions should be derived from intuition; the points or lines or planes which we intuit are not really particular at all, which is what enables them to stand as representatives of the whole of their kind.[205]

When I imagine a point, I cannot distinguish it from any other point. Frege argues from this that points, lines, and planes we intuit are not particular, but are

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[204] Although I have presented Strawson and Frege as the advocates of the same Kantian view, there is a significant difference between their accounts. Frege thinks that imagination and perception are the foundation of Euclidean geometry, whereas Strawson only claims that there is a phenomenal interpretation of Euclidean geometry. Frege is thus committed to 'intuitionism' about geometry, which confronts David Hilbert's 'formalism'. But one can, as Strawson does, hold that objects as imagined and perceived are subject to Euclidean geometry, without being an intuitionist. Since our focus is on Euclideanism about perception, which is independent of intuitionism, we will not go into discussions of intuitionism and formalism. See Frege (1971b); Frege (1971c); Frege and Hilbert (1971); Frege (1997).

[205] Frege (1953), § 13, pp. 19e-20e.

representatives of the kinds. A point I imagine, for example, is a representative of the kind point; it is not a particular point as opposed to another point, but is something that could be *any* point. If I imagine two points, I do distinguish them from each other, but this does not make them two particular points. I do not distinguish them in the sense that I could replace them with each other, or replace them with another pair of points. They are what could be *any* two points. That is why, Frege thinks, we can derive general Euclidean propositions from intuition. Since Frege includes as 'intuition' perception as well as imagination, he could argue as follows. When I have perception as of one point, I cannot distinguish it from any other point. Points, lines, and planes as perceptually experienced are therefore representatives of the kinds. When I have perception as of one straight line between two points, for example, what I am presented with (from the first-person viewpoint) is an arrangement of a representative of the kind straight line and two representatives of the kind point. That is why I could derive from my perceptual experience a general proposition that there is one straight line between two points. We need not discuss in further detail what this explanation really amounts to in order to doubt that the general proposition derived here could state a general *constraint*. Perhaps the representative of the kind straight line and the two representatives of the kind point demonstrate that, generally, there *can be* one straight line between two points. But how could these representatives show that there *cannot be* two or more straight lines between the same two points? One might explain, on behalf of Frege, as follows. I would fail if I attempt to draw on paper two straight lines between two points. Then, the perceptual experience (from my point of view) would be such that the second representative of the kind straight line fails to be located between two representatives of the kind point. This would yield a general proposition that there cannot be the second straight line between two points – that is, that there cannot be more than one straight line between two points. This explanation, however, is still inadequate. If my attempt to draw the second straight line fails, I would not draw the second line at all, or I would draw it on the first straight line, or I would draw a curved line in order for the line not to coincide with the first line. The resulting drawing would then show only one straight line lying between two points, or a straight line and a curved line lying between two points; there would not be the second straight line on paper. So, I would not, in the first place, encounter the second representative of the kind straight line which is to show that it cannot lie between the two representatives of the kind point. The general proposition derivable from my perceptual experience would at best be that there can be a straight line between two points, or that there can be a straight line and a curved line between two points, but not that there cannot be the second straight line between two points. Euclidean axioms imply that certain figures, which would be non-Euclidean, are *impossible* – e.g. that a figure consisting of two (or more) straight lines between two points is impossible. The problem is how the perceptual phenomenology could imply such impossibility. If points, lines, and planes as perceived are 'representatives', they might go beyond the actual phenomenology by standing for *any* point, line, and plane that could be involved in the perceptual phenomenology. Yet they could not present us with the *constraint* on the phenomenology. For they could not construct impossible figures, and indicate, one way or another, that they are impossible.

3. Reichenbach's argument against Euclideanism of perception

The question we raised was: what would be the grounds for thinking that there are Euclidean constraints on the perceptual phenomenology? Strawson's explanation is in terms of our inability to imagine certain figures, but it is not clear how that inability would relate to the putative constraints on the perceptual phenomenology. Frege would presumably answer the question by asserting that points, lines, and planes are 'representatives' such that the phenomenology incorporates generality. I have denied that such generality could entail general constraint on the perceptual phenomenology.

Could Kant explain the reason why we should think that the perceptual phenomenology is constrained by Euclidean geometry? In fact, Kant as interpreted in our 'nativist' way could. On our 'nativist' reading of Kant, pure intuition involves geometry prior to perception, and makes perception possible. This would be why the constraints on imagination, i.e. the 'construction' of a concept of shape in pure intuition, serve as constraints on perception. What Kant appeals to is not precisely our inability to imagine or to draw non-Euclidean figures, but is rather pure intuition of space, which precedes actual perception and involves Euclideanness. There are geometrical constraints on the perceptual phenomenology because all possible perceptions have to depend on pure intuition. Such an explanation for the constraints on the perceptual phenomenology is not available on the 'epistemic' interpretation of Kant, because it rejects the notion of intuition containing geometry prior to perception.

Should we then accept the view that the perceptual phenomenology is bound to be Euclidean? Since Strawson and Frege fail to give a satisfactory justification for this view, we are left with the explanation given by our 'nativist' interpretation of Kant. The 'nativist' explanation might be right, but it consists of claims which are not proved – i.e. the claim that we have pure intuition which contains geometry before any perception, and the claim that perception has to depend on pure intuition.

So we are not compelled to accept the account that the phenomenology has to be Euclidean. In what follows, I will propose an alternative phenomenological account which is based on Reichenbach's criticism of the Kantian view as to Euclidean constraints on perception. Reichenbach's argument is not that non-Euclidean perception is possible, but rather that Euclidean geometry and non-Euclidean geometry are equally applicable to the actual perception.

Reichenbach contends that non-Euclidean as well as Euclidean geometry can apply to one and the same figure we construct. (Reichenbach's consideration of figures drawn on paper is part of his consideration of figures we imagine or visualise. Let us concentrate on cases of figures drawn on paper since our interest is in perception of shape rather than imagination or visualisation of shape.) We might feel compelled to regard any figure on paper as Euclidean, but that is because we project a Euclidean assumption on a figure.

What, then, is the Euclidean assumption we project on a figure? Reichenbach holds that we project Euclidean *congruence* on it. Figure 3 is a simplified version of Reichenbach's example.[206] Suppose that the line *EF* is a straight line. If we place a measuring rod between the line *EF* and the solid line *MN*, measuring the distance between them by moving the rod from the side of *E* to the side of *F*, the result could be that the two lines are constantly equidistant. We would feel inclined to say that the rod, in order to give that result, would have to change its size – that it would have to shrink in the middle and expand at the ends. We have this inclination because we have been adjusted to a particular assumption about congruence. We could, instead, make an assumption that the length of the rod remains unchanged while it gives the result that the line *EF* and the solid line *MN* are equidistant at all positions. Our eyes

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[206] Reichenbach's diagram is in Reichenbach (1968), p. 51.

could become adjusted to this assumption. We can also suppose that the rod measures the dotted line *MN* as shorter than the solid line *MN*. We would then feel inclined to say that the rod would have to expand when measuring the dotted line, thereby measuring it as shorter than it really is. Again, according to Reichenbach, that is because we are adjusted to a particular assumption of congruence. We could be adjusted to the assumption that the size of the rod remains the same. The result of this series of measurement would be that the solid line *MN*, which is equidistant from the straight line *EF*, fails to be the shortest line between the points *M* and *N*, thereby failing to be a straight line between the points *M* and *N*. This result implies that there is no line parallel to the given straight line *EF*. For a line parallel to a given straight line would have to be not only equidistant from the given straight line, but also straight. According to the result of the above measurement, there is no line that satisfies this condition. This result is at odds with the 'fifth postulate', or 'parallel postulate', of Euclidean geometry – the postulate that through a point lying outside a given straight line there is exactly one parallel line. Hence, it is possible for space to be measured as non-Euclidean.[207] What is important is that we could not only assume the rod behaving in the above way not to change its length, but *adjust our eyes to this assumption*. We can become accustomed to assume one and the same figure to be non-Euclidean as well as to be Euclidean.[208]

[207] See ibid., pp. 51-6. In Reichenbach's original example, the dotted line *MN* is supposed as a straight line.
[208] Ibid., pp. 56-7.

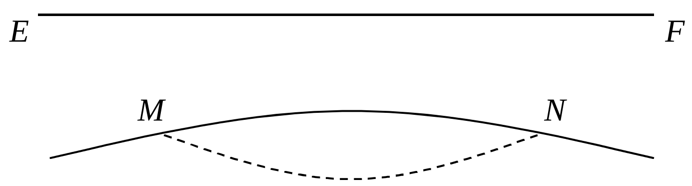

Figure 3

Reichenbach writes: ‘We have such a strong visual perception of Euclidean geometry because all our experience with rigid rods constantly teaches us Euclidean geometry’.[209] He also writes: ‘It would be different if in daily life we dealt occasionally with rigid bodies that adjusted themselves to non-Euclidean geometry’.[210] The measuring rods and rigid objects around us behave in such a way that they yield Euclidean results of measurement. It is for this reason that we have adjusted our eyes to Euclidean geometry. Had measuring rods and rigid bodies behaved in a different way, as in the above example, our eyes would have accustomed to non-Euclidean geometry.

Thus, what happens from the first-person viewpoint is this: the subject assumes certain objects, such as a rod, to be rigid, or unchanging in shape and size, and goes on to become adjusted to that assumption. For us, such an assumption has happened to result in Euclidean measurement, but it could have resulted in non-Euclidean measurement. Our eyes could be adjusted to either Euclidean or non-Euclidean geometry depending on the behaviour of the physical objects we assume to be rigid. Reichenbach justifies this account by giving three examples. The first is one of a near-sighted person putting on glasses for the first time. His vision clears, and it

[209] Ibid., p. 54.
[210] Ibid., pp. 54-5.

seems to him as though things moved when he moves. But when he becomes used to seeing with glasses, things begin to seem still. The second example is one where a driver becomes used to seeing things behind the car in a convex mirror. When a driver becomes skilled in using such a mirror, things in it no longer seem distorted, and the moving objects seem constant in shape. The third example concerns visual experience of children. He says that it often seems to children as if a train was as small as a toy, and as if a train moving further became objectively smaller. Reichenbach also says that two sides of a street seem to children to objectively converge.[211] We can say that the first and the third examples are those of 'perceptual constancy'. The first example concerns *position* constancy. There is a sense in which things seem to move when we move our head or eyes, but there is also a sense in which things seem still, or constant in position, when we move our head or eyes. The third example is one of *size* constancy. There is a sense in which a train seems to become smaller when it leaves, but there is also a sense in which it seems constant in size. The second example is an extended version of an example of perceptual constancy, or, in particular, *shape* constancy. Reichenbach thinks that we experience shape constancy even when we use a curved mirror to see – that the shapes of things in a convex mirror do not seem distorted or changing after we learn to use it. Reichenbach, in fact, does not need a mirror to introduce an example of shape constancy. When a rectangular door opens, for example, it might seem to a child as though the door changed its shape, perhaps to a trapezial shape. However, Reichenbach would claim, the child would eventually be adjusted to the constancy of the rectangular shape the door.

Reichenbach draws the following conclusion from his examples of perceptual

[211] Ibid., p. 55.

constancy:

> *Any adjustment to congruence is a product of habit*; *the adjustment is made when*, *during the motion of the objects or of the observer*, *the change of the picture is experienced as a change in perspective*, *not as a change in the shape of the objects*.[212]

When an infant looks at moving objects for the first time, it would seem to the infant as if they kept changing their positions, shapes and sizes. But their positions, shapes and sizes begin to seem more constant after the infant train the eyes. What is particularly relevant here is constancy of *shape* and *size*. A ruler could measure the line *EF* and the solid line *MN* as equidistant at all points on them, and could measure the solid line *MN* as shorter than the dotted line *MN*. This measurement of congruence will seem correct when the ruler comes to seem constant in shape and size throughout the measurement – i.e. when the ruler no longer seems to bend, shrink, or expand during the measurement. That is, an adjustment of our eyes to non-Euclidean congruence would only require an adjustment to shape and size constancy. Adjusting our eyes to shape and size constancy as such does not necessarily result in adjusting them to Euclidean or non-Euclidean congruence. It is something that ordinarily happens when looking at ordinary objects such as a train, door, and so on. In Reichenbach's view, an adjustment has actually occurred when looking at rulers that give Euclidean results. So, it should be possible for an adjustment to occur if we look at rulers measuring non-Euclidean congruence.[213]

The idea is that when the eyes become adjusted to constancy of a moving

[212] Ibid.

[213] In Reichenbach (1951), too, Reichenbach claims that if we lived in an non-Euclidean environment, 'we would get adjusted to the new environment and learn to see non-Euclidean triangles and laws in the same way that we now see Euclidean structures' (p. 140).

physical object, they become adjusted to congruence between different physical objects measured by that object. Reichenbach refers to as an 'adjustment to congruence' not only an adjustment to congruence between different physical objects at different places, but an adjustment to shape and size constancy of a single physical object that is moving. This is reasonable, since an adjustment to shape and size constancy would mean an adjustment to congruence between the shapes and sizes that a single object has at different places. We use the word 'constancy' to clarify Reichenbach's point that an adjustment of the eyes to congruence between two or more objects rests on an adjustment to shape and size constancy of a single moving object, i.e. that of a rod measuring two or more objects.

In order to pursue Reichenbach's view, I would like to consider and clarify two points for the sake of him. The first concerns what it is for a perceiver to assume measuring rods or certain physical objects to be rigid, and the second concerns what it is for us to become 'adjusted' to constancy of shape and size.

The first question is: what is it for a perceiver to assume something to be rigid? In practice, a child is often given a ruler made of material which is taken by the community to be rigid. Thus a child often need not choose by himself an object to be used for measuring other objects. A child, however, might not need such help of the community. It seems plausible that children have the ability to recognise which objects around them are rigid before given a ruler. In either case, the requirement is that a child be able to assume something to be rigid (with or without the aid of the community). What is it, then, for a perceiver to assume a particular object to be rigid? It would be to assume an object to be unchanging in shape and size regardless of the way it seems.[214] For example, if a stick is rotating horizontally before the eyes of a child, the stick might seem to the child to change its shape and size; it might seem to the child as though it was becoming shorter and longer. The requirement in question is that the child be able to assume the stick to be constant in size. At this stage of making an assumption, the stick still seems to the child to become shorter and longer. The assumption here consists in some ability of the mind that does not necessarily affect visual perception. Thus, when Reichenbach says that we assume some physical object to be rigid, I interpret his idea to be the following: when we assume a physical object to be rigid, we assume the object delivered by visual perception to be constant in shape and size regardless of the way the visual perception is from the subjective viewpoint. We will not go into the question of precisely what the mind's ability of making such an assumption might be. It will suffice for my purpose if we understand the state of making an assumption in the present sense as a state similar to having a belief to the effect that the object as seen is constant in shape and size. I also think that Reichenbach could remain neutral on whether being in such a state requires conscious judgement.

The second question is: what is it for our eyes to be adjusted to shape and size constancy? In the above example of a rotating stick, if the requirement of making an assumption of constancy is satisfied, the child would eventually become adjusted to that assumption. After the adjustment, the child would not only assume the constancy of the object as perceived, but actually be *inclined to assume* the constancy. The child would no longer be inclined to take the object as seen to be

[214] Reichenbach discusses what it is for physicists to regard something as rigid in Reichenbach (1958), pp. 19-24. Since we are interested in what it is for children and ordinary perceivers to take something as rigid in everyday circumstances, the simple answer here would be appropriate.

changing its size. Then, if the stick measures two other physical objects as congruent, for example, the child would not only assume two objects delivered by perception to be congruent, but actually be *inclined to assume* them to be congruent.

Two further significant questions would arise concerning the answer to the second question – the point concerning an ‘adjustment’. The first question would be: is perception altered when the child becomes accustomed to the assumption he makes? I would like to pursue Reichenbach’s thought by responding that the perceptual phenomenology would not be altered by the adjustment. In my example of a rotating stick, at the stage of only making an assumption of constancy, i.e. before the child becomes accustomed to the assumption of constancy, the child is still inclined to assume the object delivered by perception to change its size. The child, assuming the object delivered by perception to be rigid, would need to suppress that inclination. For the child to become accustomed to the assumption of constancy is for him to no longer have that initial inclination, and to acquire a different inclination, i.e. an inclination to assume the object delivered by perception to be constant in size. The perceptual phenomenology remains the same throughout this process.

It is important to notice the following consequence of the above construal of Reichenbach’s thought: the object as visually perceived is itself neither constant nor changing in shape and size. In the example of a rotating stick, the child might be naturally inclined to assume the object as seen to be changing its shape and size at first. This does not imply that the object as perceived *per se* changes its shape and size. The implication is only that the child has an inborn inclination to assume the object delivered by perception to change its shape and size. This is an empirical fact about the inclination the child has from birth in relation to visual perception, but not a fact about visual perception *per se*. The child goes on to become inclined to assume the object delivered by perception to be constant in size. This means that the inborn inclination has ceased, and that the child has acquired a new inclination which matches the assumption of constancy he makes. Again, this would not imply that the object as perceived is itself constant in size. There is no fact of the matter as to whether it is the inborn or acquired inclination that correctly reflects the phenomenology. One and the same object involved in the phenomenology could be taken either to be constant or to be changing in shape and size, there being no more fundamental fact about the phenomenology. In other words, the phenomenology as such involves neither constancy nor change of shape and size that could be taken *at face value*. Rather, the perceiver is inclined to assume either constancy or change of shape and size. The same would be true of congruence between two or more objects as experienced. If the stick in my example measures two objects as congruent after the child's adjustment to the assumption of constancy, the child would be inclined to assume two objects delivered by visual perception to have the same size. This has no implication as to whether the two objects as perceived are congruent or incongruent in themselves. There is no such thing as taking the congruence or incongruence between two or more objects delivered by visual perception *at face value*. Rather, we are inclined to assume either congruence or incongruence between them.[215]

The second question regarding an 'adjustment' would be: even if it is true that the child in my example would eventually be adjusted to the rotating stick, would he have to be adjusted to all other physical objects that are constant in shape and size? Indeed, many of the things around us are rigid in an ordinary sense (as opposed to

[215] Since the phenomenology is not altered by the change of the perceiver's inclination, perhaps an adjustment of the eyes should rather be called, say, an adjustment of the mind. But this would only be a matter of terminology.

the physicist's sense). Do we need to be adjusted to all of them? This does not seem to be the case, for clearly an adjustment is not needed in every new situation. How, then, have we generalised what we have been taught by some particular physical objects? I would respond, on Reichenbach's behalf, that some objects delivered by perception have features that incline us to take them as constant in shape and size. Suppose that the child, having become accustomed to seeing the stick rotating horizontally, is presented with another stick which is smaller and is rotating vertically. He might not need to begin another adjustment. Reichenbach's reason for this would be that the second perception, from the first-person viewpoint, has some similarities with the first one – that there are some cues that incline the child to assume the object delivered by visual perception to be constant in size. There would then be further (empirical) questions as to what those cues might be, whether they are detected at the conscious level, and so on. At any rate, Reichenbach would acknowledge that the fact that we do not need training with every new rigid object around us suggests that there are some cues available to the mind (either at the conscious or unconscious level) which allow us to bypass training.

As is clear from the above discussion, Reichenbach's phenomenological view is tied to his empiricist tenet. I would like to separate the former from the latter in order to clearly contrast Reichenbach's phenomenological view with Kant's phenomenological view. Reichenbach thinks that children have no or only poor capacity to experience shape or size constancy, and that it requires experience to fully acquire that capacity. Reichenbach would presumably say that the child looking at a rotating stick would be inclined to assume the object delivered by perception to change its size at first, and that only after a while would he be inclined to take it as constant in size. Although this might be true, Reichenbach's phenomenological view need not depend on such an empirical fact about the constitution of our mind. The child might be inclined to assume the object delivered by perception to be constant in size from the outset. Even if this is empirically correct, it would not follow that the object as perceived *per se* is constant in size. Rather, the object as perceived is itself neither constant nor changing in size. The phenomenology as such involves neither constancy nor change of shape and size that could be taken at face value by the subject. This phenomenological claim can be separated from the empiricist view that our inclination of assuming the phenomenology to involve shape and size constancy is acquired rather than inborn.[216]

Thus, Reichenbach's phenomenological account of congruence between two or more objects can also be separated from his empiricist view. On Reichenbach's account, a perceiver becomes adjusted to congruence between two or more objects by means of becoming adjusted to the constancy of a rod that measures the objects as congruent. One might question whether Reichenbach is right in thinking that we need such an adjustment in order to discard the inborn inclination and form a new one. However, such a question concerns an empirical fact about our inborn or acquired inclination to take the objects delivered by perception to be congruent, but not a fact about the congruence contained in the phenomenology itself. The phenomenological view is this: there is no fact of the matter as to whether the objects as perceived are congruent or incongruent with each other. There is no such thing as taking at face value congruence or incongruence delivered by perception. Whatever our inborn and acquired inclinations of making an assumption as to congruence or

[216] According to A. D. Smith's survey, recent evidence shows that infants are capable of experiencing size constancy. Our discussion here clarifies that Reichenbach's phenomenological view can be construed as neutral on such an empirical fact. See Smith (2000).

incongruence between the objects as experienced, the visual phenomenology as such involves no congruence or incongruence between objects.

We can now criticise the Kantian response to Molyneux's Question from the standpoint of Reichenbach's phenomenological view. The Kantian response, which allows a positive answer, is based on the phenomenological view that the objects as perceived are bound to be three-dimensional and Euclidean. According to the Kantian response, Molyneux's subject could know that he could never have experience as of an additional part congruent with *a* lying between *A* and *B*, thereby knowing that he can call *a* a 'straight line' and *A* and *B* 'points'. (See Figure 1 and Figure 2. Let us suppose, as we did in the previous Chapter, that the phenomenology of looking at these figures is that of looking at a cube and a globe.) One might think it convincing that the newly sighted subject could not imagine there being the additional part. If so, that is because our mind has an inborn or acquired inclination to take the phenomenology in a particular way, i.e. an inclination to impose Euclidean congruence on the phenomenology. It is wrong to suppose that the phenomenology itself involves Euclidean congruence. The same holds for *C*, *D* and *c*. It might seem plausible that Molyneux's man could imagine having experience as of the additional part *d* between *C* and *D*. But, again, that is because our mind is inclined to take the phenomenology to involve Euclidean congruence, rather than because the phenomenology itself is bound to be Euclidean. There is no geometry of the phenomenology to which the Kantian could appeal to justify a positive answer to Molyneux's Question.[217]

[217] Reichenbach himself, with his empiricist view as well as the phenomenological view, would deny that we (and Molyneux's subject) have the inborn inclination to take the phenomenology to be Euclidean. Reichenbach thinks that we have adjusted our eyes to Euclidean congruence. Thus he would deny, responding to the Kantian

4. Hopkins' criticism of Reichenbach

We have presented Reichenbach's phenomenological view that the objects as visually perceived are neither Euclidean nor non-Euclidean, separating it from his empiricist view. Before pursuing it as an alternative position, let us respond to Hopkins' criticism of Reichenbach's argument.[218] Below is a figure Hopkins uses.

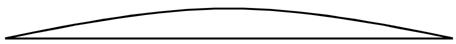

Figure 4

Reichenbach would insist as follows: it is possible for a measuring rod to give the result that the lines *d* and *e* are equal in length, and that they are shorter than any other distances between their ends. (Perhaps we can imagine that a rod, when measuring *d*, grows slightly longer than when measuring *e*, and shrinks when placed anywhere else. Then the rod would measure *d* and *e* as shorter than any other distances between their ends.) Reichenbach's empiricist view entails that we will become accustomed to such *prima facie* incorrect measuring, and so that it will seem to us as though there are two straight lines between two points. Hopkins does not

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answer to Molyneux's Question, that the newly sighted man, without further experiences, could come to think that he could have perception as of an additional part congruent with *a* located between *A* and *B*. If a ruler behaves in such a way that it measures such an additional part as congruent with *a*, he would come to take it as congruent with the part *a* (as perceived). Reichenbach would also deny that Molyneux's subject could come to take the parts *b* and *c* in Figure 2 (as perceived) to be congruent. For example, further experiences with a measuring rod might make him take the part *b* (as seen) to be shorter than the part *c* (as seen). The newly sighted man could not derive any conclusion as to congruence from the phenomenology until he adjusts his eyes to a certain kind of congruence by looking at what would serve as a measuring rod.

[218] Hopkins (1973) has his own argument that visual experience is not Euclidean, but we will not discuss it here. I think that his own argument is compatible with Reichenbach's phenomenological account.

deny that a rod can measure *d* and *e* as equal in length, and as shorter than any other distances between their ends. What he denies is that we can be adjusted to such measurement. He contends that *d* will never cease to seem longer than *e*. To imagine a rod measuring them as equal, Hopkins holds, must be to visualise the rod measuring *d* as longer than the rod measuring *e*. He says that no change of aspect comparable to that in the duck-rabbit case could occur in the case of his figure; there is no aspect of seeing *d* and *e* as congruent.[219]

As we have seen, Reichenbach argues for his account from cases of shape and size constancy. We can respond to Hopkins' criticism using the following example of shape and size constancy. Let us imagine a case where there is a terrestrial globe before the eyes of a perceiver. (See Figure 5. Suppose that the lines *e'* and *d'* are the lines delivered by visual perception when a perceiver looks at a terrestrial globe.) The globe is slowly rotated. The visual phenomenology is such that the line *e'* moves to where the line *d'* was before the rotation. There is a sense in which the line *e'*, during and after the rotation, seems to change its shape and to become longer. Yet it also seems as though the line is constant in shape and size. In order to make this case of shape and size constancy similar to Hopkins' example, let us suppose that the globe is not rotated. It seems to the perceiver as though the lines *d'* and *e'* differ in shape and size. Nevertheless, the visual phenomenology being the same, the two lines can also seem to have the same shape and size. The phenomenology might involve two lines lying between the same two points. But it involves neither congruence nor incongruence between them, and the perceiver is inclined to assume them either to be congruent or to be incongruent. In Hopkins' example, too, the visual phenomenology might involve two lines lying between the same two points.

[219] Ibid., pp. 8-9.

However, it involves neither congruence nor incongruence between them. Hopkins' argument only points out that our mind has a strong inclination of assuming incongruence in his example, unlike in the case of a terrestrial globe.

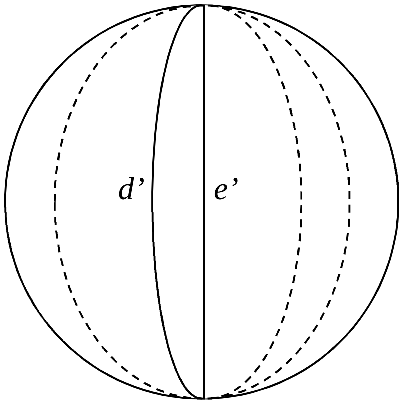

Figure 5

Reichenbach, based on his empiricist view, would argue in the following way. The reason why we would be inclined to assume congruence in the case of a terrestrial globe is that we have had experiences as of latitude lines being measured as congruent by objects we assume to be rigid. Similarly, if we repeatedly have perception as of the lines *d* and *e* being measured as equal by objects we assume to be rigid, we *will* begin to have an inclination to assume them as equal in length. Since I do not adopt Reichenbach's empiricist view, my point would be as follows: the visual phenomenology of looking at Hopkins' figure involves neither congruence nor incongruence between two lines, and it is only an empirical and contingent fact that we are strongly inclined to assume them to be unequal. The visual phenomenology itself does not exclude the possibility of our being inclined to assume them to be equal. (It is also empirical and contingent that we can be inclined to assume either congruence or incongruence in the case of the latitude lines.)

The Kantian might object to the above response to Hopkins' criticism. The Kantian might accept that, in the example of a terrestrial globe, we could be inclined to assume the lines *d'* and *e'* to be congruent as well as to be incongruent. If we are inclined to assume congruence between them, it might be argued, we would assume them to lie on a convex (if not spherical) surface, but would not assume them to be non-Euclidean. For two equal lines lying between two points on a convex (or spherical) surface will not violate Euclidean geometry; they will not even if they both are the shortest lines between the two points that could be drawn on the surface. So, from the claim that we can be inclined to assume *d'* and *e'* to be congruent, it does not follow that we could be inclined to assume them to be non-Euclidean. In Hopkins' example, on the other hand, we could not be inclined to assume the two lines delivered by perception to be congruent, because the assumption that the two lines as seen lie on a flat surface would violate Euclidean geometry. The perceptual phenomenology puts a constraint on our mind such that we must be inclined to take it as Euclidean. The Kantian would assert: Hopkins' criticism of Reichenbach is right in the sense that the phenomenology of looking at his figure must incline us to take it as involving two incongruent lines, for, generally, the phenomenology must incline us to take it as Euclidean. The Kantian would further conclude that it is because the phenomenology *is* Euclidean that the phenomenology must incline us to take it as Euclidean.

The above argument, however, begs the question. If the Kantian employs Hopkins' criticism of Reichenbach, the initial point would be that the line *d* will never cease to seem longer than the line *e*. This point would have to ground the claim that the phenomenology must incline us to take it as Euclidean (and the further conclusion that the phenomenology is Euclidean). However, in the above argument, the Kantian defends the initial point by appeal to the claim that the phenomenology must incline us to take it as Euclidean; the truth of the claim to be defended is presupposed at the outset. It might be true that, in the case of a terrestrial globe, our being inclined to assume congruence between the two lines delivered by perception would entail our assuming them to lie on a three-dimensionally curved surface. (Then the risk of violating Euclidean geometry would be avoided.) If so, however, why could it not be that our being inclined to assume congruence between the two lines as seen in Hopkins' case results in assuming them to be non-Euclidean? The Kantian would have to beg the question if his reason is that the assumption of congruence in Hopkins' case would violate Euclidean geometry.

5. Conclusion

Reichenbach's view that the visual phenomenology is neither Euclidean nor non-Euclidean is based on the argument that it does not involve congruence or incongruence. This argument is, in turn, based on cases of shape and size constancy. When there are rigid objects such as a measuring rod and a train, we may either be inclined to assume the objects delivered by visual perception to be constant in shape and size, or be inclined to assume them to be changing their shape and size. (Reichenbach would say that an inclination to assume constancy is acquired, but I do not make an empiricist distinction between inborn and acquired inclinations.) We may make different assumptions as to shape and size constancy in relation to the same visual phenomenology. The same is true of congruence between two or more objects delivered by visual perception. When there are such things as latitude lines of a terrestrial globe, we may either be inclined to assume congruence between the objects as seen, or be inclined to assume incongruence between them. (Reichenbach would explain that, at least in some cases, an inclination to assume congruence is acquired together with an inclination to assume constancy, e.g. by looking at a rod moving and measuring more than one object. But, again, I am not committed to the distinction between inborn and acquired inclinations.)

Kant, Frege, and Strawson do not provide a convincing argument for the tenet that the perceptual phenomenology has to conform to Euclidean geometry. I have presented Reichenbach's phenomenological view as a tenable alternative. His phenomenological view is that the visual phenomenology does not involve congruence – i.e. shape and size constancy of a single object and congruence between two or more objects. I will develop this view to propose my view that the visual phenomenology involves no flat or solid shape. Before I do this, I would like to respond to the following question: Reichenbach's phenomenological view rests on his treatment of the examples of perceptual constancy, but is his account of shape and size constancy really correct? Can he rightly derive his phenomenological view from his examples? In the next chapter, I will defend Reichenbach's phenomenological view against this question by considering contemporary accounts of shape and size constancy.

Chapter 7:

Perceptual Constancy of Shape and Size

In the previous chapter, we saw Reichenbach's criticism of the Kantian view that perception is bound to be Euclidean. Reichenbach's argument rests on his examples of perceptual constancy of shape and size. The idea is that cases of shape and size constancy are cases where we impose more than one assumption of congruence on one and the same object delivered by visual perception. In this chapter, I will consider two cases with a round coin viewed from an angle. I will use the two cases as touchstones for examining contemporary accounts of shape and size constancy.

Firstly, I will discuss Peacocke's theory of the dichotomy between 'representational' and 'sensational' aspects of experience which he proposes in his *Sense and Content*. My discussion will not disprove his theory, but will point out a disadvantage of it. Secondly, I will consider Peacocke's view in *A Study of Concepts*, in which he has a wider notion of perceptual representation. My cases with a slanted coin, however, cannot be fully explained in terms of perceptual representation. Thirdly, I will see that Michael Tye's notion of representation (or, in particular, the notion of a representation of a visual angle) cannot sufficiently explain one of my cases. Finally, we will see that Reichenbach's phenomenological view can explain the two cases without causing difficulty.

1. Peacocke's 'sensational properties' of experience

In *Sense and Content*, Peacocke contends that experience has not only 'representational properties', but 'sensational properties'.[220] 'Representational properties' are properties that experience has in virtue of having representational content, or in virtue of representing the external world. In contrast, 'sensational properties' are those which experience has in virtue of having a non-representational aspect – or, as Peacocke puts it, an aspect of 'what it is like to have that experience'.[221] Peacocke proposes the view that there is a sensational aspect of experience, which does not represent the world.

Peacocke argues for this view from examples. I would like to discuss two of them, to which the case of a slanted circle can be made analogous. One is an example in which a subject looks at two trees, one being a hundred yards away and the other being two hundred yards away. The visual experience represents these trees as having the same size. Nevertheless, it is also the case that the nearer tree occupies a larger area of the 'visual field' than the other tree. Peacocke denies that the difference in size between the two trees as visually perceived is a difference in the representations of the trees, because their sizes are represented as the same. Thus, the phenomenological difference between the sizes of the trees consists in the non-representational, sensational aspect of experience.[222]

Another example is one in which the perceiver uses one eye to see a cube built with wire (see Figure 6). The perceiver first sees the side ABCD as nearer to her than the side EFGH. After what Peacocke regards as a change of aspect, the perceiver sees the side EFGH as nearer to her than the side ABCD. The representation of the

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[220] Peacocke (1984).
[221] Ibid., p. 5. See also Peacocke (2008), p. 1.
[222] Peacocke (1984), p. 12.

relative positions of the sides before the aspect change differs from that after the aspect change. Yet there is a sense in which, from the subjective point of view, the experiences before and after the aspect switch are of the same kind. Since the representational content does change with the aspect change, Peacocke thinks that we need sensational properties to explain why the two consecutive experiences could be classified as the same.[223]

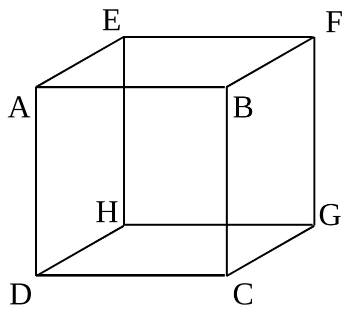

Figure 6

Notice that Peacocke's notion of the 'sensational properties' of experience is tied to his notion of the 'visual field', which he thinks is *two-dimensional*. In his view, one of the two trees represented by experience occupies a larger region of the two-dimensional 'visual field' than the other, and the wire cube represented by experience occupies the same region of the two-dimensional 'visual field' both before and after the aspect change. The sensational properties in these examples consist in size and shape found in the plane visual field.[224]

Peacocke could deal with the case of a slanted circle as he deals with the case of the two trees in the following way. Suppose that there are two coins before a

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[223] Ibid., pp. 16-7.

[224] For Peacocke, the 'visual field' is 'a real, curved plane in space, a plane individuated … by its relation to the two retinas', and so is what is determined by the physical world (Peacocke (2008), p. 7).

perceiver, one viewed head-on and the other viewed from an angle. (Let us call this case the two-coin case.) Both coins seem to the perceiver to have the same shape. Peacocke's explanation would be that the representational content represents the two coins as having the same shape. Yet there is a sense in which the two coins seem to have different shapes. This, Peacocke would claim, shows that there is a non-representational aspect of experience, which he would label as 'sensational'. One of the two coins occupies a circular area of the two-dimensional visual field, whereas the other coin occupies an elliptical area of it.[225]

The following is how the case of a slanted coin could be treated analogously to the wire cube case. Suppose that a slanted coin is viewed with one eye. The object does not seem circular at first, seeming only elliptical. After a while, it begins to seem circular. (Let us call this case the one-coin case, and refer to the change of the seeming shape as the 'S-change'.) Peacocke would explain the S-change as follows. The visual experience before the S-change represents an elliptical object, whereas the visual experience after the S-change represents a circular object. Despite this change in the representation, something in the visual experience remains unchanged. Peacocke's proposal would be that it is the sensational aspect of experience – or, that it is the elliptical region of the plane visual field occupied by the represented object.

I do not adopt Peacocke's notion of sensational properties or his notion of the two-dimensional visual field, but I think that there is something to be explained in the two-coin case and the one-coin case. In the two-coin case, there is certainly a sense in which the two coins seem to have different shapes. Why is this the case when the two coins do seem to have the same round shape? Concerning the one-coin

[225] This thought can be found in Peacocke (1987) and Peacocke (2008). Peacocke touches on examples of a dinner plate and a coin, holding that they can occupy an elliptical area of the visual field (Peacocke (2008), p. 1; p. 6; p. 20).

case, I would insist, without using Peacocke's notions, that the following is true: there is a sense in which the object as seen undergoes *no change at all*. The wire cube case may show this point more clearly. When the arrangement of the sides constituting the cube seems to change drastically, there is a sense in which the object as seen remains entirely the same. Despite the fact that the way the wire cube seems changes drastically, it would not seem to us as though the cube's sides have actually moved, or as though the cube has been instantaneously replaced with another wire cube. Rather, we would ordinarily say, for example, that no change has happened to the object itself, or that it is only the way we see it that has changed. The same would be true of the one-coin case. If an object which has seemed elliptical comes to seem round to us, we would presumably say, for example, that the object has not changed at all, but the way we see it has. I am not claiming that what the perceiver says of a change in experience is always correct. My claim is that we ought to be able to do justice to or explain away the intuition that there is a *prima facie* sense in which the object as seen does not change at all in the wire-cube case and in the one-coin case. (In a footnote of the paragraph where he introduces the wire-cube example, Peacocke refers to Wittgenstein's *Remarks on the Philosophy of Psychology*, in which Wittgenstein, discussing various cases of seeing an aspect, writes of an aspect change in general as follows: 'Something about the optical picture of the figure seems to alter here; and then again, nothing alters after all'[226].) Thus, I think that the correct account of shape and size constancy needs to be able to explain the sense in which the two coins seem *incongruent* in the two-coin case, and the sense in which the coin itself seems to undergo *no change at all* in the one-coin case.

[226] Wittgenstein (1980), § 33, p. 9e. See Peacocke (1984), p. 16.

Then, in order to account for the sense in which the two coins seem incongruent in the two-coin case, and the sense in which the coin itself seems to undergo no change at all in the one-coin case, should we accept Peacocke's dichotomy between representational and sensational aspects of experience? I think not. Peacocke would explain the two-coin case by denying that the two different shapes in question are properties of the objects as perceived. He would say that the visual experience represents the objects as having the same circular shape, while the represented objects occupy circular and elliptical regions of the visual field. So, if Peacocke is right, the circular and elliptical shapes are not properties of the objects as perceived, but are properties of the regions of the plane visual field. However, in my view, if we look at an upright coin and a slanted coin, we would think it natural to say that there is a sense in which the *objects* seem to differ in shape. I doubt that it would be more correct to say that the areas of the two-dimensional visual field occupied by the two objects (represented by experience) have different shapes. To give an example of size perception, we ordinarily say, looking at an aircraft in the sky, 'A large aircraft looks tiny'. Would it give a more correct description of the phenomenology to say, instead, that the area of the two-dimensional visual field occupied by a large aircraft (represented by experience) is tiny? We would simply say that it is the aircraft that looks tiny, while also looking large. Two things having the same shape can seem both congruent and incongruent, e.g. in the two-coin case, and one and the same thing can seem both large and small, e.g. in the case of an aircraft. If Peacocke attempts to resolve such paradoxical facts by stripping some shapes or sizes off the (represented) objects, ascribing them to the visual field, the resulting description of the phenomenology would be unintuitive and artificial. In the two-coin case, the two objects seem to have the same shape, while there a sense in which *the same two objects* seem to have different shapes.

Concerning the one-coin case, Peacocke would say that the representational aspect of experience changes, or, in particular, that the representation of an elliptical shape is taken over by the representation of a circular shape. What remains the same, Peacocke would claim, is the other aspect of perceptual experience, which is sensational. However, as we stressed, there is a sense in which no change occurs to the *object* as seen in the one-coin case. We would ordinarily say that there is a sense in which the *object* undergoes no change at all. Peacocke could not say this, for what survives the aspect change, for him, would be the shape of the area of the visual field occupied by the represented object, rather than the object as seen.

The above considerations would not disprove Peacocke's account, for he might claim that we are only used to speaking as if a property of the visual field was a property of the object as perceived. However, his artificial description of the phenomenology would make his account less appealing. He could not simply say, concerning the two-coin case, that there is a sense in which the two *objects* seem incongruent, and concerning the one-coin case, that there is a sense in which the *object* seems to remain entirely unchanged.

2. Peacocke's nonconceptual content

Peacocke believed, when he wrote *Sense and Content*, that representational content of experience had to be wholly conceptual. He rejects this view in *A Study of Concepts*, introducing two types of nonconceptual representational content. They are termed ‘scenario content’ and ‘protopropositional content’.[227] Peacocke has not abandoned the view that experience has sensational properties, but since he has a wider notion of representational content, incorporating nonconceptual content, I would like to consider whether he would explain the two-coin case and the one-coin case by appeal to ‘representational properties’ of experience.

‘Scenario content’, according to Peacocke, is specified by the way surfaces are located in relation to the ‘origin’ and ‘axes’. There are points in egocentric directions and distances.[228] Scenario content nonconceptually represents (at least) whether or not there is a surface at each of those egocentric points, and, if there is, what the surface’s texture, hue, saturation, orientation, etc. are.[229] What is important for us is the following: scenario content represents presence or absence of a surface located in egocentric directions and distances.

Peacocke denies that scenario content is exhaustive of nonconceptual content. A regular diamond, without being moved, can be seen either as an upright diamond or as a tilted square. There is a phenomenological difference between seeing a regular diamond as an upright diamond and seeing it as a tilted square. This difference cannot be captured by scenario content, for the egocentric position of the object and its features are not affected by whether we see it as a diamond or as a tilted square. If I see it as a diamond, and then as a square, for example, the shape need not thereby change its egocentric location. Nor, of course, need it change its texture, hue, and so on. According to Peacocke, the difference between the two ways of seeing a regular diamond is captured by ‘protopropositional content’. In his view, the difference in

[227] Peacocke (1992).
[228] Peacocke mentions a distance, as well as a direction, as what determines a representation of an egocentric location of a surface. See ibid., p. 69.
[229] Ibid., pp. 62-4.

question is in the way we perceive *symmetries*. When a perceiver sees a regular diamond as a diamond, on the one hand, the shape seems symmetrical about the bisectors of its angles. When a perceiver sees it as a square, on the other hand, it seems symmetrical about the bisectors of its sides. Peacocke denies that we employ the concept ‘symmetrical about’ whenever we perceive an object as a diamond or square. For him, the property of being symmetrical about something can enter nonconceptual representational content. He classifies such content as protopropositional. Other properties and relations that he claims can be included in protopropositional content are square, curved, parallel to, equidistant from, and same shape as.[230]

Could the author of *A Study of Concepts* account for the two-coin case without appeal to sensational properties? One might think that Peacocke could explain the sense in which the two coins seem incongruent in the following way. The phenomenological difference between looking at an upright coin and looking at a slanted coin is a difference in the scenario content. An upright coin seems circular, and all of its parts seem to be (roughly) at the same distance from me. This is not true of a slanted coin that seems circular. For different parts of it seem to be at different distances from me; its top edge would seem to be further away from me than its bottom edge. I do not think that this is a promising strategy. According to this strategy, the phenomenological difference between the experience as of an upright circle and that as of a slanted circle is in the representation of the object’s egocentric position. This, however, only amounts to the explanation that the phenomenology involves two circular shapes situated differently. Scenario content could not explain why there is a sense in which the two coins seem to differ in shape.

[230] Ibid., pp. 75-9.

Then, could protopropositional content explain the sense in which the two coins seem to differ in shape in the two-coin case? According to Peacocke, visual experience can represent a regular diamond either as an upright diamond or as a tilted square. For him, this is because protopropositional content can represent the symmetry of a regular diamond in two different ways. Then, one might explain, on Peacocke's behalf, that visual experience can represent a slanted circle either as a circle or as an ellipse, because protopropositional content can represent the property 'curved' of a slanted circle in two different ways – that is, protopropositional content can represent a slanted circle either as having a circular curve or as having an elliptical curve. So, one might say, the slanted coin can seem either congruent or incongruent with the other coin represented as circular. An explanation of this sort might be tenable. However, I will deny that protopropositional content could adequately account for the one-coin case.

Let us now turn to the one-coin case, in which a slanted coin, viewed with one eye, seems only elliptical (but not round), and then comes to seem round. There is a sense in which no change seems to occur to the object itself. Could Peacocke's nonconceptual content explain what survives the S-change? First, it is not scenario content that persists through the change. For the representation of egocentric distance of the object has to change because of the change. When a slanted coin seems elliptical, all of its parts are represented as (at least roughly) equidistant from me. But when it comes to seem round, the upper edge of the round object would be represented as further away from me than its lower edge. The egocentric positions of the object's parts would be represented differently after the S-change.

It might be said as follows: Peacocke could hold that it is *part* of the scenario content that remains unchanged in the one-coin case. The scenario content would remain the same with respect to the *egocentric directions* of the object's parts. All the parts of the coin would be (nonconceptually) represented as located in the same direction from me before and after the aspect change. The top edge of the object, for example, would be represented as being in the same egocentric direction whether the object seems elliptical or circular. This might seem to explain the persisting element in the one-coin case. However, this explanation could not answer the question why there is a *prima facie* sense in which the object seems to undergo no change at all. The perceiver might report that the egocentric directions of the parts of the object as perceived have not changed. But this should not be what is meant if the perceiver says that the object as seen has not itself changed at all.

Second, protopropositional content would also fail to explain the one-coin case. Among the relations and properties which Peacocke thinks can be included in protopropositional content, it might be that the representation of symmetry and that of curvedness are common before and after the S-change. Peacocke might say that the elliptical shape represented before the change and the circular shape represented after the change share their horizontal and vertical axes of symmetry, and are both curved. Perhaps these characteristics are (nonconceptually) represented in the same way before and after the S-change. However, it would be left unexplained why, as I have stressed, the perceiver would be inclined to say that the object has not changed at all, and that it is only the way she sees it that has changed. Persistence of the representation of symmetry and that of curvedness would only amount to persistence of some of the properties of the object as seen. Peacocke's protopropositional content could not sufficiently account for the peculiarity of the one-coin case.

3. Tye's representationalism and visual angles

Peacocke's nonconceptual representational content in *A Study of Concepts* could not fully account for the two-coin case and the one-coin case. Peacocke still needs the notion of the sensational aspect of experience to fully account for the phenomenology. Tye, in contrast, admits no non-representational element in the phenomenology. His representationalist position is that the phenomenal character of experience *is* representational content – that is, the phenomenology represents the external world.[231] In his view, picking out any element found in what is phenomenally present to us would result in picking out a representation of something mind-independent. Bright redness phenomenally present to me, for example, is bright redness of an external object, e.g. a tomato, represented by my experience. On Tye's representationalism, this is true of everything included in the phenomenal character of experience.

Could Tye's representationalism account for the two-coin case and the one-coin case? Let us begin by looking at his criticism of Peacocke's notion of sensational properties. In one of Peacocke's examples, two trees seem the same in size, while there is also a sense in which one of them seems larger than the other. Tye rejects Peacocke's account, which appeals to the sensational properties of experience. According to Tye, the phenomenological difference between the sizes of the two trees is the difference between the representations of *visual angles*. One of the trees seeming larger than the other represents its subtending a larger visual angle than the other tree.[232]

[231] Tye (2002a), p. 137. See also Tye (1995), pp. 134-7.
[232] Tye (2002b), p. 453.

As Tye mentions, Peacocke in *Sense and Content* denies that a visual angle can be represented by the object's size in the visual field. Peacocke's reason for this denial is that representational content has to be conceptual – that is, that perception with a certain representational content requires the subject's possession of the concepts constituting that content. However, Peacocke says, even for someone who lacks the concept of a visual angle, it could be the case that one of the trees occupies a larger area of the visual field. This, for Peacocke, proves that representational content of experience involves no concept of a visual angle, and therefore represents no visual angle.[233]

Tye's proposal is that a representation of a visual angle is *non*conceptual. If the representation is nonconceptual, the perceiver need not entertain or acquire the concept of a visual angle in the case of the two trees. Thus, the difference in size between the trees included in the phenomenology nonconceptually represents the difference between the visual angles they subtend.[234]

The same explanation could be applied to the two-coin case. The upright coin and the slanted coin both seem to have the same shape. This, for Tye, means that experience conceptually represents two objects having the same shape. At the same time, there is a sense in which the two coins seem to differ in shape. Tye would explain this in terms of nonconceptual representations of visual angles. Let us suppose that the top of one of the two coins is rotated away from the perceiver, the average distance of the coins from the viewpoint being equal. The visual angle subtended by the vertical diameter of the slanted circle would be smaller than that subtended by the diameter of the upright circle. (Figure 7 illustrates the side view of

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[233] Peacocke (1984), pp. 19-20.
[234] Tye (2002a), p. 453.

the two coins in relation to the viewpoint.) Then, the slanted coin seeming to have a smaller vertical length than the upright coin – thereby seeming elliptical – nonconceptually (and veridically) represents the visual angle subtended by the slanted coin being smaller than that subtended by the upright coin. Since the representations of these two visual angles are nonconceptual, the coins can seem different in shape, or one of them can seem elliptical, without the subject possessing the concept of a visual angle.

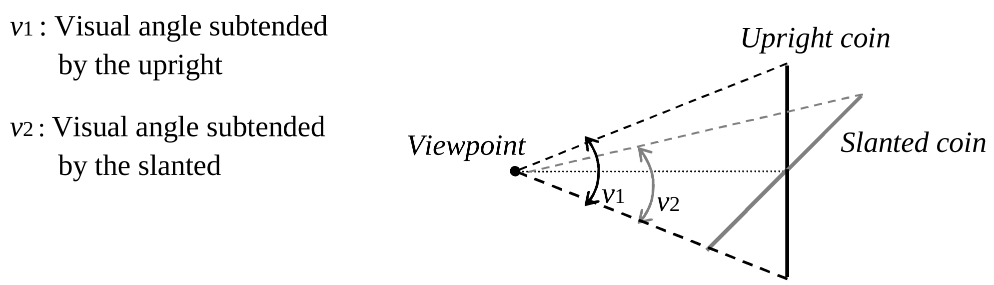

Figure 7

In my view, however, Tye's theory could not adequately explain the one-coin case. Peacocke's explanation of the case where a perceiver looking at a wire cube experiences an aspect switch is that the representational properties change while the sensational properties remain unchanged. Tye criticises Peacocke's account, contending that what remains the same, as well as what changes, is representational. According to Tye, experiences before and after the aspect change represent some common spatial properties. For example, both of the consecutive experiences represent the side ABCD as being lower than the side EFGH, and represent the side

AEHD as being to the left of the side BFGC. For Tye, Peacocke is wrong in taking what remains the same after the change as non-representational.[235]

Tye would explain the one-coin case in a similar manner. When the S-change occurs, the subject's experience ceases to represent an ellipse, and begins to represent a circle. Nevertheless, the representational content partly remains unchanged. For example, the upper part of the object is still represented as being higher then the lower part, and the left edge is still represented as slightly to the left of the top edge. This would only mean that some of the spatial relations between the parts of the object are represented in the same way before and after the S-change. It would still be puzzling why there is a sense in which the object does not seem to change at all. (For the same reason, I think that Tye's explanation of the wire cube case is inadequate.)

4. Reichenbach

According to Reichenbach's phenomenological view, the object as visually perceived is itself neither constant nor changing in shape and size. Moreover, two or more objects delivered by visual perception are themselves neither congruent nor incongruent with each other. So, there is no description of congruence or incongruence that could be obtained by taking the visual phenomenology at face value. In the two-coin case, there is nothing in the phenomenology that the perceiver could take at face value to describe that the two objects as seen are congruent or incongruent. So, if the perceiver describes that the two objects as seen are congruent, she is only inclined to assume their congruence. If the perceiver describes that the two objects as seen are incongruent, she is only inclined to assume their

[235] Ibid., p. 454.

incongruence. The description that the two objects as seen are congruent or that they are incongruent would be a description imposed on the phenomenology due to the perceiver's inclination. Thus, in the two-coin case, the perceiver might be inclined to impose on the phenomenology the description that the two objects as seen are congruent, or the description that they are incongruent. Neither of these descriptions would result from the perceiver's taking the phenomenology at face value. For there is nothing in the visual phenomenology that the perceiver could take at face value to describe their congruence or incongruence.

In the two-coin case, there are both a sense in which the two objects seem congruent, and a sense in which they seem incongruent. If so, the perceiver is both inclined to assume their congruence and inclined to assume their incongruence. One might ask: is it possible to have two conflicting inclinations in relation to the same phenomenology? Reichenbach would presumably explain, from the empiricist standpoint, that the inclination to assume congruence between the two objects as seen is an acquired inclination, whereas the inclination to assume incongruence between them is an inborn one. As we saw in the last chapter, he says that a train that is leaving seems to a child to become smaller. His view is that a child learns to experience constancy of shape and size. Reichenbach would say that a child who looks at an upright coin and a slanted coin for the first time would be inclined to assume that the two objects as seen are incongruent. Perhaps the child goes on to become used to looking at an upright coin and a slanted coin being measured as congruent by a ruler (or an object he assumes to be rigid), or become used to looking at a rotating coin, assuming the object as seen to be rigid. What is required for learning is an empirical matter. At any rate, the child, after a necessary training stage, will acquire the inclination to assume that the two objects as seen are congruent when looking at an upright coin and a slanted coin. Thus, if Reichenbach's empiricist account is right, it would be that the two conflicting inclinations are inborn and acquired ones. It would presumably be that the acquired inclination is stronger for adults, who would be more inclined to assume congruence between the two objects as seen in the case of an upright coin and a slanted coin. But if there is also a sense in which the two coins seem to differ in shape, it would be that the inborn inclination has diminished, but has not completely ceased.

Since I have separated Reichenbach's phenomenological account from his empiricism, I present the phenomenological account as neutral on whether the two conflicting inclinations are inborn or acquired. Thus the phenomenological view is compatible with a possible claim that, in the two-coin case, the inclination to assume congruence is inborn whereas that to assume incongruence is acquired. (Strawson (1979) would adopt this claim. He would say that it requires a sophisticated attitude to describe coins viewed from various angles as differing in shape.) My phenomenological view could also allow that, in the two-coin case, both of the conflicting inclinations are inborn, or that they are both acquired.

In the two-coin case, although the upright coin and the slanted coin seem congruent, there is a sense in which they seem to differ in shape. My explanation is that the perceiver in the two-coin case has both of the conflicting inclinations. This would not be to ascribe a contradictory state to the perceiver. Generally, it is possible for us to have conflicting inclinations. To give an example outside the topic of perception, when I hear an unrealistic story, I might feel inclined to believe it, and also feel inclined to deny its truth. Although it is contradictory both to believe and not to believe the story, it is possible both to be inclined to believe it and to be inclined not to believe it. Analogously, it would be contradictory to make both an assumption of congruence and an assumption of incongruence regarding the same two objects delivered by perception. But it would be possible to have both an inclination to assume congruence and an inclination to assume incongruence. If the perceiver reports that the two coins not only seem congruent, but seem incongruent, she has the two conflicting inclinations at the same time. (One inclination might be stronger than the other.)

From the standpoint of Reichenbach's phenomenological view, the explanation of the one-coin case would be as follows. Before the S-change, the coin only seems elliptical to the perceiver. This means that the perceiver has an inclination to assume that the width and height of the object as perceived are unequal in length. After the S-change, the coin seems circular to the perceiver. This means that the perceiver comes to be inclined to assume that the width and height of the object as seen, or all diameters of it, are equal in length. The perceiver does not have this latter inclination before the S-change. That is why the coin *only* seems elliptical at first. After the S-change, the perceiver might say that there is still a sense in which the slanted coin seems elliptical. If so, this would be because the first inclination has not completely ceased. Neither the first nor the second inclination is an inclination to take the phenomenology at face value.

The above explanations of the two-coin case and the one-coin case can accommodate the intuition that, in the two-coin case, there is a sense in which the two *objects* seem to differ in shape, and that, in the one-coin case, there is a sense in which the *object* seems to undergo no change at all. In the two-coin case, there is a sense in which the two objects seem to have different shapes, because the perceiver is inclined to assume the two *objects* delivered by perception to be incongruent with each other. Or if the perceiver thinks it natural to say that there is a sense in which the two *objects* seem to have different shapes, the perceiver is inclined to assume that the two objects delivered by perception are incongruent. In the one-coin case, there is a sense in which the *object* does not seem to change at all. This is because the object as perceived really undergoes no change all. Indeed, the visual phenomenology remains entirely unchanged while the perceiver's inclination in relation to it changes. As have pointed out, our inclination and assumption do not affect the visual phenomenology.

Reichenbach's treatment of shape and size constancy grounds his criticism of Kant's tenet that perception is bound to be Euclidean. I have shown that we should prefer Reichenbach's treatment of it to contemporary explanations of it. Contemporary theories would not be an obstacle to pursuing Reichenbach's phenomenological view.

Chapter 8:

Externalism

We will begin this chapter by considering John Campbell's externalism about shape perception. His account is that the phenomenology of shape is constituted by the shapes in the physical environment. Based on this phenomenological view, Campbell gives a positive answer to Molyneux's Question. If his phenomenological view is right, the truth of (C1) would entail that (C2) is false, and so the argument for (C5) would be rendered unsound. However, I will not adopt Campbell's externalism in order to reject the argument for (C5). I will point out that his account might have difficulty in explaining the one-coin case I introduced in the last chapter. By developing Reichenbach's phenomenological view, which I have been pursuing, I will propose the view that visual perception delivers no flat or solid shape. My view endorses the claim (C2), but I will show that my view is compatible with externalism about perception, and, therefore, that there is a way to avoid accepting the claims (C3), (C4), or (C5).

1. Campbell's externalism

The position Campbell proposes is 'radical externalism', on which the phenomenal character of shape experience is constituted by the external shape.

> … what makes one's consciousness consciousness of shape is the fact that one is using a neural system whose role is to pick up the shape properties of the objects in one's

environment. The geometrical aspects of one's experience of objects will then be constituted by the geometry of the objects in one's surroundings.[236]

Perceptual experience is as of shape if the neural system for detecting shape in the environment is used. If this neural system detects a square object in the external world, for example, then the perception would be as of a square shape. What determines the shape as phenomenally experienced is the external shape detected by the neural system. That is, the phenomenal character of shape perception is determined by the external shape property.

Thus, on radical externalism, phenomenal characters of shape perception are *externally* individuated; they are individuated by shape properties in the world around us. For example, the phenomenal characters of two experiences enjoyed by two different people would be of the same kind if there is a cubical box before their eyes; the relevant neural systems of the two people would detect the same external shape property, i.e. that of being cubical. (The phenomenal characters would be the same regardless of whether the two are before one and the same box or before two different boxes. The grounds of the individuation of phenomenal characters, i.e. the external property of being cubical, would be the same in either case.) Furthermore, the phenomenal characters of two experiences enjoyed by a single person at two different times would be the same if the external object is cubical at both of the times. The person's neural system would detect the same external shape property, which thereby constitutes the phenomenal characters of both experiences.[237] (Again, the

[236] Campbell (1995a), p. 302.
[237] Ibid., pp. 302-3. Campbell admits that the possibility of an illusion of shape would cause a problem for the radical externalism. He does not explicitly say what an illusion of shape might be, but one example would presumably be an illusory experience as of a circle when there a spinning propeller. The phenomenal character of this illusory experience would be the same as that a veridical perception has when

outcome would be the same whether or not the physical object at one time and the physical object at the other time are one and the same, so long as they have the same shape.)

Campbell treats in an analogous way a case where the same kind of external shape is perceived through sight and touch.

> On this radically externalist picture, shape perception will be amodal, since the different senses will be picking up the very same properties of the objects around one. Insofar as we are externalist about shape perception, we have to think of it as amodal. For insofar as we are externalist about shape perception, we have to think of it as a single phenomenon, in whatever sense-modality it occurs, individuated by the external geometrical property. For it is in fact the very same properties that are being perceived by sight and touch.[238]

Suppose that a subject looks at a cubical box, and touches it. What it is like for her to see the box would be the same as what it is like for her to feel it. For the phenomenal character of the visual shape experience and that of the tactile shape experience would both be constituted by the same external shape property, i.e. the box's property of being cubical. (It is not significant whether the box before the eyes and the box being touched are one and the same. Insofar as they are cubical, the visual and tactile phenomenal characters would be constituted by the same kind of physical

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there is a circle before her. A shape could be phenomenally present to the subject regardless of whether there really is a shape in the environment. How, then, could the radical externalist explain the individuation of a phenomenal character of shape perception by an external shape? Campbell does not fully respond to this problem, but gives a 'gesture' at a solution by repeating that the radical externalist could appeal to the neural system used for detecting shape in the environment; both in veridical and illusory cases, perception is one as of a shape because this neural system is active. The idea seems to be that what distinguishes phenomenal characters of shape experiences from those of other experiences is not the internal state of affairs accessible by the perceiver alone, but rather such a neural system, which is externally individuated.

[238] Ibid., p. 303.

shape.) It is clear that Campbell intends to give a positive answer to Molyneux's Question here. The newly sighted subject, *ex hypothesi*, has touched a cube and a globe, and knows what it is like to feel them. We cannot deny that he, even before recovering from blindness, already knows what it is like to see them. For what it is like to see a cube or a globe is the same as what it is like to feel a cube or a globe respectively. It would then be obvious that the newly sighted subject could correctly name the two shapes placed before him. The phenomenology of his visual experience would be constituted by the external shape properties which have constituted the tactile phenomenology in the past. Campbell claims:

> … insofar as we are externalist about the character of shape perception, then there is nothing in the character of the experience itself to ground a doubt as to whether it is the same properties that are being perceived through vision as through touch.[239]

One who doubts that Molyneux's subject could name the two shapes before him assumes that the visual phenomenology and the tactile phenomenology of shape are individuated internally, rather than externally. There would be no room for such a doubt if the phenomenal characters of shape perceptions are constituted by the external shapes; the sameness of the external shape properties would entail the sameness of the phenomenal characters even across sight and touch.

Campbell's radical externalism is about the *phenomenal character* of shape experience, and so is to the effect that the external shape constituting perceptual experience is phenomenally present to the perceiver. It is for this reason that he can give a positive answer to Molyneux's Question.

[239] Ibid.

> For the radical externalist … there is no difference in the phenomenal character of shape experience in sight and in touch. The sameness of property perceived in sight and touch is transparent to the subject, and cross-modal transfer is a rational phenomenon.[240]

In Campbell's view, the phenomenal character of the newly sighted subject's visual experience is constituted by the cube and the globe before him. Campbell can thus say that the shapes that are phenomenally present to Molyneux's subject through sight are of the same kind as those that have been phenomenally present to him through touch. The qualitative identity of the shapes as visually perceived and those as tactilely perceived would be 'transparent to the subject'.

While asserting that the phenomenology is homogeneous across sight and touch with respect to shape properties, Campbell admits that it might not be with other respects. The following is his response to what he thinks is the reason given by his opponent.

> … notice that the reason given for saying that shape sensations are different in sight and touch is not compelling. The reason given is that we can always tell through which sense we are perceiving shape. But this does not of itself show that the shape sensations are different, it shows at most that there is a difference between the total experience of seeing a shape and the total experience of feeling a shape. It would be consistent with that to hold that some analysis of the experience is possible, and that the 'shape' aspects of the experiences are exactly the same though there is some further dimension along which the experiences are different, and that it is this further, separate aspect of experience that lets us know which sense-modality is in play.[241]

[240] Ibid., p. 304.
[241] Campbell (1995b), p. 357.

When perceiving shape, we always know which sensory modality is used; we are never confused whether the shape is perceived by sight or by touch. This does not mean, Campbell claims, that there is a difference between the visual and tactile phenomenology of shape. His suggestion is that we know which sensory modality is in play because of some difference in the phenomenology which is not itself the phenomenology of shape. He does not specify what the difference might be, but thinks that a pair of visual experiences would serve as an example. Holding that the phenomenology of shape is amodal, he writes:

> There may still be further phenomenal differences between [sight] and touch, which may tip us off as to which sense we are using, but these will be extrinsic to the geometrical characteristics of the perceptions. And it will be possible for different geometrical descriptions to be given of the very same shapes in sight than in touch; indeed, two different visual perceptions of the same shape may give different geometrical descriptions of it, as when one object is a rotated version of another, similarly shaped thing. In this case it may still be informative to be told that the shapes are the same; so if vision and touch give different geometrical descriptions of the same shape, it may still be informative to be told that it is the same shape one is seeing as touching. But given the unity of the underlying, externally constituted geometry of the two senses, it will be possible for the perceiver to determine *a priori* that it is the same shape that is in question.[242]

For example, experience of looking at a cube lying on its side might be phenomenologically different from experience of looking at a cube balanced on its corner, such that the perceiver fails to know that she is presented with the same kind

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[242] Campbell (1995a), p. 317.

of shape.[243] For Campbell, this difference does not consist in the phenomenology of shape *per se*, which is the same in both cases. So the perceiver could come to know *a priori*, or with some 'cognitive work', that there is the same kind of shape in the two cases.[244] (He denies that this 'cognitive work' is deductive, characterising it as involving 'the more basic kind of image rotation', which pertains to the level of perceptual system. He also calls it 'imagistic reasoning'.[245]) Campbell accepts that the same might be true of a cross-modal case. Thus, Molyneux's subject might not be able to name the two shapes before him at first; it might be 'informative' for him to be told that they are a cube and a globe. Even if this is true, on Campbell's account, 'cognitive work' (or 'imagistic reasoning') would allow the newly sighted man to know what the visually presented shapes are.[246]

One might challenge Campbell's view by pointing to a difference between the case of seeing shape and that of feeling shape. Suppose that I look at a cube, and that there seem to be three square sides. Even if we suppose that the three sides do seem square to me, there would remain a sense in which they seem incongruent. There would remain a sense in which, say, one of the sides seems square whereas the other two seem parallelogramic (or perhaps trapezial). We can suppose that the cube is made of wire, none of its sides being occluded. Even if we allow that the six sides seem square to me, there would again be a sense in which they seem incongruent. In contrast, if I hold a cube in my hand, there seem to be six square sides that are (at least roughly) congruent with each other. Unlike in the case of vision, I need not add that there is a sense in which the six sides seem incongruent. If Campbell's

[243] He gives this example in (Campbell (1995b), p. 359). He also mentions a case of seeing a square and seeing a diamond.
[244] Ibid., pp. 395-60.
[245] Ibid., pp. 360-1.
[246] See also ibid., p. 361.

externalism is right, it would be that a cube constitutes my experience both in the visual and tactile cases – that is, the same shape constitutes the visual and tactile perceptions. How, then, could Campbell account for the difference between the visual case and the tactile case? Could he explain that the difference is in some phenomenal character which is 'extrinsic to the geometrical characteristics of the perceptions'?

Campbell, in his *Reference and Consciousness*, introduces the 'Relational View', which is about the phenomenal character of perceptual experience in general. It shares the basic idea with the radical externalism about shape perception.

> On a Relational View, the phenomenal character of your experience, as you look around the room, is constituted by the actual layout of the room itself: which particular objects are there, their intrinsic properties, such as colour and shape, and how they are arranged in relation to one another and to you. On this Relational View, two ordinary observers standing in roughly the same place, looking at the same scene, are bound to have experiences with the same phenomenal character. For the phenomenal character of the experiences is constituted by the layout and characteristics of the very same external objects. We have the ordinary notion of a 'view', as when you drag someone up a mountain trail, insisting that he will 'enjoy the view'. In this sense, thousands of people might visit the same spot and enjoy the very same view. You characterize the experience they are having by saying which view they are enjoying. On the Relational picture, this is the same thing as describing the phenomenal character of their experiences.[247]

According to the Relational View, the phenomenology of perceptual experience is constituted by the objects around the perceiver, their properties such as colour and shape, and their spatial relation to one another and to the perceiver. We should focus

[247] Campbell (2002), p. 116.

on Campbell's thought that the phenomenology is constituted not only by the shapes of the physical objects, but by the ways physical objects are situated in relation to the perceiver. Thus, if a cube is before my eyes, my visual phenomenology might involve, say, three congruent square sides, but it also involves their different spatial relations to my eyes. The visual phenomenology is determined not only by the external shape, but also by the spatial relation between the external shape and the eyes.

Campbell calls his view the Relational View because, 'on this view, the relation "S perceives O" is taken as primitive', such that 'it is not analysed in some such terms as "O causes S to have an experiential content as of something's being F" '.[248] It seems to me that, for Campbell, the primitiveness of the relation of perception between the subject and the physical object consists in the ordinary meaning of such phrases as 'a man seeing the view'. We ordinarily understand the relation of seeing obtaining between a person and a view. We ordinarily take a 'view' to be objective and physical, so, for example, we can understand what it is for two people to share one and the same view, or, what it is for two people to be in a relation of perception to one and the same physical state of affairs. Campbell would think it wrong to engage in an analysis of such ordinary understanding, taking it as primitive. He also writes of a 'view' as follows:

> … the Relational View says only that the qualitative character of conscious experience is constituted by the characteristics and layout of the objects one is seeing. It is consistent with that to say that only certain of their characteristics constitute one's experience of them. For example, hidden characteristics of the objects will play no role in constituting one's experience of them. Hence, the egocentric spatial layout of the scene may play a

[248] Ibid., pp. 117-8.

> role in constituting the qualitative character of one's experience of the scene. So long as the ordinary notion of a 'view' is coherent, it is coherent to suppose that the egocentric layout of the scene could constitute the content of someone's experience of it.[249]

If I look at a cube made of opaque sides, some of its sides would occlude the others. Campbell would acknowledge that, although the phenomenal character of my visual experience is constituted by the physical property of being cubical, it need not involve all of the cube's sides. We ordinarily talk of the way a cube is situated in relation to us by saying, for example, 'We can only see three of the box's sides if we stand here'. Similarly, Campbell would hold, we ordinarily say such things as, 'The top of the box doesn't look square from here'. Insofar as we do not encounter contradiction in speaking this way, Campbell would conclude, it is not contradictory to suppose that the physical property of being cubical constitutes the visual phenomenology.

If Campbell is right, the argument for (C5) would be refuted. It follows from his externalist view that if (C1) is right, (C2) is wrong. If the description of the objects as felt mentions both flat and solid shapes, the tactile phenomenology is constituted by the flat and solid shapes in the external world. These flat and solid shapes in the environment also constitute the visual phenomenology, so the description of the objects as seen should also mention both flat and solid shapes. Thus, the argument for (C5) would have to be unsound.

However, I will not adopt Campbell's externalism. I do not see how his view could explain the one-coin case – one of the two touchstones I introduced in the last chapter. In the one-coin case, where a slanted coin is viewed with one eye, the object seems simply elliptical at first, and begins to seem circular later. There is some kind

[249] Ibid., pp. 119-20.

of change from ellipticalness to circularity which the perceiver could report, but this change cannot be explained in terms of the physical state of affairs. For there is no change in the physical circular shape of the coin and its relation to the perceiver, who views the coin from an angle. Visual perception delivers two different shapes, i.e. an ellipse and a circle, although there is only one physical shape, i.e. a circle, viewed from the same angle. Does this mean that the visual phenomenology of shape is not determined by the physical shape and its relation to the eyes? Does the one-coin case show that there is internal individuation of shape experiences, such as visual experience as of an ellipse and visual experience as of a circle? Campbell's account might be able to respond to this problem. However, I will pursue Reichenbach's phenomenological view, which can clearly explain the one-coin case. Indeed, in what follows, I will show that a different form of externalism is possible. It is the externalist version of Reichenbach's phenomenological view. By presenting it as a possible position, I will argue that there is a way to accept (C1) and (C2) but avoid the step to (C3).

2. Reichenbach's phenomenology of shape

Before I show that Reichenbach's phenomenological view is compatible with externalism, I will develop his view to see what it amounts to. Reichenbach might not agree with my development, but I will draw from his account the implication that shapes are not delivered by visual perception.

On Reichenbach's phenomenological view, the object delivered by visual perception is, in itself, neither constant nor changing in shape and size. Rather, the perceiver assumes it to be constant or not (without affecting the visual phenomenology). Moreover, when visual perception delivers two or more objects, they are, in themselves, neither congruent nor incongruent with each other. The perceiver makes assumptions as to their congruence or incongruence. There is no fact of the matter as to whether the visual phenomenology involves shape or size constancy or congruence, independently of the assumptions made by the perceiver. In other words, there is nothing in the visual phenomenology that the perceiver can take at face value to describe it as involving constancy of shape and size or congruence.

Let us consider a possible objection to my position. My explanation of the two-coin case is that the two objects delivered by visual perception are neither congruent nor incongruent. One might admit that, in the two-coin case, the subject could be either inclined to assume congruence between the two objects as seen, or inclined to assume incongruence between them. However, one might say, if a round coin and a square card are viewed head-on, for example, we would be inclined to assume incongruence between the objects as seen, without being inclined to assume congruence between them. If we are told to make an assumption that the two objects as seen are congruent with each other, we would think the assumption abnormal and difficult to make. Does this not show that there is something in the visual phenomenology that we can take at face value to say that certain assumptions of congruence or incongruence are normal whereas others are abnormal? My answer is ‘no’. Why is it that the example of a round coin and a square card might seem to pose a challenge to my view? The reason should be as follows: in the case of a round coin and a square card, even if we decide to assume that the objects as seen are congruent, we could still say that the two objects as seen, in fact, have different kinds of edges, i.e. that one of the objects as seen has a curved edge whereas the other has four straight edges. However, on my account, one who says this imposes on the visual phenomenology particular descriptions of congruence and incongruence, i.e. that the two objects as seen have incongruent edges, and that one of the objects as seen have four congruent edges. Such descriptions are not obtained by taking the boundaries of the objects as seen at face value. It seems true that, in the case of a round coin and a square card, we would have the inclination to think it difficult to assume congruence between the two objects as seen. There might be something in the phenomenology to which our mind reacts with that inclination. But it would not be something that involves congruence or incongruence in itself, and the fact that our mind reacts to it with the inclination in question would be empirical and contingent.

It might be further objected as follows: it is obvious that we can describe, by taking the objects as seen at face value, at least the incongruence between *curved* and *straight* edges. To respond to this objection, let us suppose that next to the round coin and the square card (both viewed head-on) is a round coin viewed from its edge. *O1*, *O2*, and *O3* are the objects delivered by visual perception when there are, respectively, a round coin viewed head-on, a square card viewed head-on, and a round coin viewed from its edge (see Figure 8). We might be inclined to describe that the edge of *O1* and the top and bottom edges of *O3* have the same curve. Yet, at the same time, we might also be inclined to describe that the edges of *O2* and the top and bottom edges of *O3* are all straight. Then, if we are to describe the visual phenomenology by taking it at face value – or, if we are to give a *faithful* description of the visual phenomenology – should we describe the top and bottom edges of *O3* as curved or as straight? There is no answer to this question. We only impose the description that the top and bottom edges are curved and are the same as the edge of *O1*, or the description that the top and bottom edges of *O3* are straight and are the same as the edges of *O2*. Neither of these descriptions is a faithful description of the top and bottom edges of *O3*. Hence, there is not even a faithful description of curved or straight edges of the object as seen. We might feel a strong inclination to describe that the edge of *O1* is incongruent with the edges of *O2*, but it would not follow that this description is a faithful description of the phenomenology, or a description obtained by taking the phenomenology at face value. Recall also our discussion of Hopkins' figure (Figure 4) in Chapter 6. Looking at Hopkins' figure, we might be strongly inclined to describe the two lines delivered by perception as incongruent. But as have been shown by the case of the latitude lines of a terrestrial globe, we could be inclined to describe either that the lines as seen are congruent, or that they are incongruent. Descriptions of equality or inequality of lines are imposed on the visual phenomenology. So, if we describe that each edge of *O2* is shorter than any other distances between its two ends, for example, we are imposing this description on the object as seen. We might have been equally inclined to impose on it a description that an edge of *O2* is not the shortest distance between its ends. Then, is the faithful description of the edges of *O2* that they are straight? My answer is that there is no faithful phenomenological description of straight or curved edges.

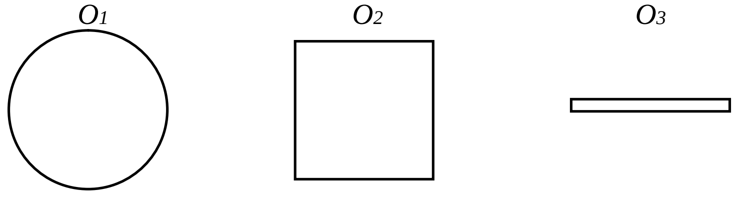

Figure 8

Leibniz's phenomenological view might pose a challenge to my account. He holds the thesis (LB*vt*4) that the objects as visually or tactilely perceived have a determinate number of prominent parts. This phenomenological thesis implies that the objects as seen have a determinate number of prominent parts. Leibniz would claim that we can count the number of such parts, and give descriptions of the objects as seen with respect to the number of their salient parts. Then, for example, if Leibniz regards the case of a round coin and a square card as one where the objects as seen have different numbers of prominent points, one having none and the other having four, he might argue as follows: even if we are told to assume that the two objects as seen are congruent in this case, it will remain true that we can count the different numbers of prominent parts. (He might also claim that this is why we would find it difficult to make the assumption of congruence in the case of a round coin and a square card.) However, my account would deny that we could take the visual phenomenology at face value to count the numbers of distinguished parts, if counting distinguished parts means counting congruent parts. On my account, we would fail to take the objects as seen at face value even in saying which parts are congruent with each other. Leibniz himself presumably would not hold that counting prominent parts means counting congruent parts, for he denies that objects as seen (or those as felt) have shape; things without shape could not have congruent parts. If so, counting prominent parts, for Leibniz, might mean counting qualitatively identical parts. But even if we could in some way count qualitatively identical parts of the objects as seen by taking the phenomenology at face value, counting them, even for Leibniz, would not mean counting congruent parts by taking the phenomenology at face value. The conclusion is again that we cannot take the objects delivered by visual perception at face value to describe congruence or incongruence between them. This is true even of congruence or incongruence between parts of the objects as seen.

The consequence of my development of Reichenbach's phenomenological view is that *shapes are not delivered by visual perception*. In order for visual perception to even deliver a shape as simple as a square, for example, it is necessary that it deliver four straight-line segments. Yet visual perception does not deliver congruence between lines. It does not even deliver incongruence between a straight line and a curved line. If the visual phenomenology does not involve congruence or incongruence between objects, the outcome is that it involves no shape. When we think that we describe shapes delivered by visual perception, we are in fact imposing a description of shapes on the phenomenology by assuming particular congruence and incongruence between the objects and their parts delivered by perception.

3. An answer to Molyneux's Question

I would like to pursue Reichenbach's phenomenological view as developed in the above way. Then, my view has the implication that the visual phenomenology involves no shape. In order to support the claim (C2) – that the description of the objects as seen mentions no solid shape – let us, by responding to Molyneux's Question, clarify the specific implication that visual perception delivers no solid shape.

Suppose that the phenomenology of looking at Figure 9 is the phenomenology of looking at a cube and a globe. Molyneux's subject encounters the same phenomenology when he recovers from blindness. (The letters and dotted lines are not drawn on the cube and globe. By using the letters, I shall refer to the parts or areas of the objects as seen.) When Molyneux's subject looks at the cube, he might be inclined to assume that the object as seen has three congruent parts – that the parts *A*, *B*, and *C* are congruent. This assumption of congruence is necessary for Molyneux's subject assuming that the object as seen is cubical. It need not be that Molyneux's subject knows the definition of a cube. Whether or not he knows the definition of a cube, his assuming that the object has congruent parts is necessary for his assumption being to the effect that the object as seen is a cube. If he assumes that the object as seen has incongruent parts, e.g. that the parts *A*, *B*, and *C* are incongruent, there would be no way he could assume that it is a cube, which consists of congruent parts. The visual phenomenology does not exclude the possibility of Molyneux's subject assuming that the object as seen consists of incongruent parts. For it would not be that Molyneux's subject could take the phenomenology at face value to assume that the object as seen has congruent parts. If Molyneux's subject happens to assume that the object as seen has incongruent parts, he would not be able to assume that it is a cube.[250]

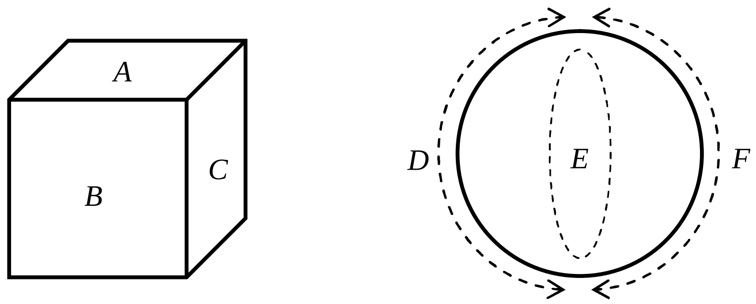

Figure 9

[250] There is even a possibility that Molyneux's subject might not count *A*, *B*, and *C* as three parts.

When Molyneux's man looks at the globe, he might assume that the width and height of the object as seen are equal, that (at least roughly speaking) such areas as *E* is in the same shape as *D* and *F*, and so on. Molyneux's subject making such assumptions would be necessary for his assuming that the object as seen is a globe. If he assumes, for example, that the width is far larger than the height, or that the shape of the area *E* is utterly different from the shape of *D* or *F*, he would not be able to assume that the shape as seen is a globe, or that it is a solid object with a uniformly shaped surface. The possibility of Molyneux's subject making such assumptions is not excluded by the visual phenomenology because it does not involve congruence. There is nothing in the phenomenology that he could take at face value to make the assumptions necessary for assuming that the object as seen is a globe.

Our phenomenological account does not deny a positive answer to Molyneux's Question. Molyneux's subject might happen to be inclined to make assumptions necessary for assuming and describing that the objects as seen are a cube and globe. Indeed, they are assumptions we are normally inclined to make when looking at a cube or a globe. Looking at a cube, we are normally inclined to assume that, for example, that the object as seen has congruent parts – that the parts *A*, *B*, and *C* are congruent. Looking at a globe, we are normally inclined to assume, for example, that the width and height of the object as seen are equal, and that (at least roughly) such areas as *E* is congruent with *D* and *F*. Molyneux's subject might also be inclined to make the same assumptions. However, my account of the visual phenomenology allows that he might be inclined to make different assumptions about congruence, or that he might not be inclined to make any assumption about congruence. The visual phenomenology puts no constraint on the assumption which Molyneux's subject might make regarding congruence or incongruence. If Molyneux's subject happens to have any inclination to make particular assumptions as to congruence or incongruence between the objects as seen (or between their parts), this would not be because he takes the visual phenomenology at face value, but because the subject's mental or physical constitution happens to have biased tendencies to react to things delivered by visual perception. We do have the biased tendencies of assuming *A*, *B*, and *C* as congruent, or of assuming the area *E* as congruent with *D* and *F*. It might be necessary for a positive answer to Molyneux's Question that Molyneux's subject have the same kind of biased tendencies. Whether he would have such tendencies depends on empirical facts about his, or our, mental or physical constitution, but not on facts about the visual phenomenology. Thus, my account of the visual phenomenology allows a negative answer to Molyneux's Question. Molyneux's subject might not make assumptions as to congruence or incongruence necessary for assuming and describing that the objects as seen are a cube and globe.

There are cases where we are inclined to assume the object delivered by visual perception to be a cube or a globe. This, however, does not mean that the visual phenomenology involves a cube or a globe. The phenomenology being the same, we might not make assumptions of congruence necessary for assuming the object delivered by visual perception to be a cube or a globe. Even to describe that the object delivered by visual perception is a solid shape as simple as a cube or a globe, we rest on particular assumptions of congruence. Hence, the visual phenomenology itself involves no solid shape.

4. Conclusion

In previous chapters, we have seen phenomenological accounts which would support the argument for (C5). Kant and Campbell offer a way to object to the argument, but I have pursued and developed Reichenbach's phenomenological view. My view is that shapes, including solid shapes, are not delivered by visual perception. It might seem that I support the argument for (C5), for my account endorses the claim (C2) that the description of the objects as seen mentions no solid shape. However, if my account is combined with externalism, I need not accept the argument for (C5).

Before we proceed, let us show that my phenomenological account can do justice to most of the phenomenological theses that would support the argument for (C5). We can understand Locke's thesis (L*v*) and Reid's thesis (R*v*1), which are to the effect that the shapes as seen are all flat, as descriptions imposed on the visual phenomenology. Because the visual phenomenology as such involves no flat or solid shape, it is such that we can assume it to involve only flat shapes.

Our account that visual perception delivers neither flat nor solid shapes might seem similar to Berkeley's thesis (B*v*1) that the shapes as visually perceived are neither flat nor solid. However, my view is not precisely the same as Berkeley's thesis, because Berkeley's thought underlying (B*v*1) is that depth is not delivered by visual perception. My account is based on the thought that congruence (or incongruence) is not delivered by visual perception.

Berkeley's thesis (B*v*2) that the shapes as visually perceived constantly change with bodily movement would reinforce the argument for (C5). I do not endorse (B*v*2) because, on my account, a perceiver can either describe that the shapes as seen change with bodily movement, or describe that they do not change with bodily movement. There is no fact of the matter as to which description is faithful to the phenomenology. Hence, we should understand (B*v*2) as a description Berkeley imposes on the visual phenomenology, being inclined to assume change of shape. Drawing on the experience of shape constancy, Berkeley holds that the shapes as seen are too changeable to be called by the names of shapes. He thinks that they cannot be named because the proportion between the parts of their outline constantly changes. Berkeley is right in holding that the outlines of the objects delivered by visual perception cannot be called by the names of shapes. But the reason for this is not that the proportion between their parts is changeable, but that there is no determinate proportion involved in the visual phenomenology.

Leibniz holds the thesis (LB*vt*2) that perception delivers no shape, which entails the thesis (LB*vt*3) that the objects as visually or tactilely perceived are neither two- nor three-dimensional. One might focus on the implication as to visual experience, i.e. that the objects as seen are neither two- nor three-dimensional, in order to support the claim (C2). That is, one might contend that the objects as seen are not 'distinct' or 'exact' enough to have shape, or to be two- or three-dimensional. For Leibniz, this view is linked with his tenet that the definitions of shape, which are 'distinct' and 'exact', are from within the mind, and that we apply them to the objects delivered by perception. Although I am not committed to this tenet, I can endorse (LB*vt*2) and (LB*vt*3) with respect to vision. The objects as seen are not 'distinct' or 'exact' enough to have shape, or to be flat or solid. My explanation is not that the subject applies the definitions of shape to them, but that the subject makes assumptions as to congruence or incongruence between them.

Recall Reid's phenomenological thesis (R*v*2) that the large shapes delivered by visual perception are not strictly Euclidean. In Reid's example, visual perception delivers a large triangle the sum of whose interior angles is larger than two right angles. We can understand Reid as imposing a particular description of congruence on the visual phenomenology. His description is to the effect that the sum of the interior angles of a large triangle as seen is larger than the sum of the interior angles of a small triangle. The visual phenomenology, involving no congruence or incongruence, does not constrain us to give a description that all the triangles as seen have interior angles whose sum is equal to two right angles.

Among the phenomenological views that can support the argument for (C5), I agree to Leibniz's theses (LB*vt*2) and (LB*vt*3) with respect to visual experience. I have denied the similar thesis (B*v*1) because of what Berkeley means by it. However, I can do justice to (L*v*), (R*v*1), (R*v*2), and (B*v*2), understanding them as descriptions which the philosophers imposed on the visual phenomenology. My diagnosis is that the philosophers imposed those descriptions because the visual phenomenology involves no congruence or incongruence, and so no flat or solid shape.

As I said in Introduction, my aim is to show that the phenomenological claims (C1) and (C2) do not entail the claims (C3), (C4), and (C5). For this purpose, I assume the truth of (C1) – that the description of the objects as felt mentions both flat and solid shapes. My phenomenological view supports the claim (C2) that the description of the objects as seen mentions no solid shape. My description of the visual phenomenology is that there is no flat or solid shape. Nevertheless, I need not be committed to the claim (C3) – that the description of the objects as felt and that of the objects as seen cannot both be a description of the physical objects around us. For my phenomenological view is compatible with externalism.

Leibniz would agree with my view that visual perception delivers no flat or solid shape. But he would also maintain that the objects as seen are mind-dependent objects – i.e. that the visual phenomenology is constituted by mind-dependent objects. I can hold, instead, that the mind-independent objects constitute the visual phenomenology. An immediate question would be: can the visual phenomenology involve physical objects without involving shape? It is not contradictory to suppose that it can. For example, the externalist about perception would not be required to suppose that the visual phenomenology involves temperature by involving the physical objects, which have a particular temperature. Obviously, vision is insensitive to certain physical properties, such as temperature, hardness, mass, etc. It might be surprising that shape is one of such properties, but my phenomenological account has shown how this is the case.

I do not deny that the visual phenomenology involves the physical surfaces. What I deny is that it involves physical shapes such as a square, globe, and so on. If we take the visual phenomenology at face value, a description of it is that there are surfaces with colours such as blue, brown, white, etc., and with smooth and rough textures. A description might mention other properties. Perhaps we can describe that the surfaces have contours. However, when we describe the *shapes* of the contours, we cannot but impose a particular description of shapes.

Suppose that I have a cubical box before my eyes. If I impose on the phenomenology a description that the *object* delivered by visual perception is solid, the description would be true. For the object delivered by visual perception, which I describe as solid, *is* the solid object before my eyes, i.e. the cubical box. If I describe that the object delivered by visual perception is flat, as Locke and Reid would do, my description would be false. For the object involved in the phenomenology is not flat but solid. Now, if I describe the phenomenology by saying that the object delivered by visual perception is neither flat nor solid, my description would be made false by the cubical box. Thus, in combing externalism with my phenomenological account that the objects as seen are neither flat nor solid, we should not say that the *objects* involved in the visual phenomenology are neither flat nor solid. To say this would be to simply give a false description. We should only say that the visual phenomenology involves no flat or solid shape, or that visual perception does not deliver flat or solid shape. (Compare this with the externalist saying that the visual phenomenology does not involve temperature, or that visual perception does not deliver temperature, instead of saying that the physical objects involved in the visual phenomenology have no temperature.) Therefore, when I endorse the claim (C2) that the description of the objects as seen mentions no solid shape, my description is not that the objects as seen do not have flat or solid shape, but rather that there is no flat or solid shape delivered by visual perception.

We have accepted the claims (C1) and (C2), but can still deny the claim (C3) that the description of the objects as felt and that of the objects as seen cannot both be a description of the physical objects around us. The description of the objects as felt mentioning flat and solid shapes can be a description of the objects around us. My description of the objects as seen mentioning no flat or solid shape can also be a description of the objects in the environment. If my phenomenological view and externalism are both right, to describe the objects delivered by visual perception – that is, to describe their properties such as colour and texture but no shape – would be to describe the physical objects (involved in the visual phenomenology). Thus, we have a way to avoid reaching the claim (C4) that the description of the objects as seen is not a description of physical objects, and the conclusion (C5) that the description of the objects as seen is a description of mind-dependent objects.

List of Abbreviations

NTV Berkeley, G. (1922), *An Essay towards a New Theory of Vision*, *A New Theory of Vision and Other Select Philosophical Writings*, J. M. Dent & Sons Ltd, 13-86.

(C1) The claim that the description of the objects as felt mentions both flat and solid shapes.

(C2) The claim that the description of the objects as seen mentions no solid shape.

(C3) The claim that the description of the objects as felt and that of the objects as seen cannot both be a description of the physical objects around us.

(C4) The claim that the description of the objects as seen is not a description of the physical objects.

(C5) The claim that the description of the objects as seen is a description of the mind-dependent objects.

(L*v*) Locke's view that the shapes as visually perceived are two-dimensional.

(L*t*) Locke's view that the shapes as tactilely perceived are two- or three-dimensional.

(B*v*1) Berkeley's view that the shapes as visually perceived are neither flat nor solid.

(B*t*1) Berkeley's view that the shapes as tactilely perceived include both flat and solid shapes.

(B*v*2) Berkeley's view that the shapes as visually perceived constantly change with bodily movement.

(B*t*2) Berkeley's view that the shapes as tactilely perceived are stable.

(B*v*3) Berkeley's view that the shapes as visually perceived must accompany features proper to sight.

(B*t*3) Berkeley's view that the shapes as tactilely perceived must accompany features proper to touch.

(LB*vt*1) Leibniz's view that visual and tactile perceptions which are ordinarily taken to be as of shape have nothing in common from the subjective viewpoint.

(LB*vt*2) Leibniz's view that the objects as visually or tactilely perceived have no shape.

(LB*vt*3) Leibniz's view that the objects as visually or tactilely perceived are neither two- nor three-dimensional.

(LB*vt*4) Leibniz's view that the objects as visually or tactilely perceived have a determinate number of prominent parts.

(R*t*) Reid's view that the objects as felt have no shape.

(R*v*1) Reid's view that the shapes as seen are flat.

(R*v*2) Reid's view that the large shapes delivered by visual perception are non-Euclidean.

(R*v*3) Reid's view that the shapes as seen have mathematical properties (as external shapes does).

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