

Editorial essay: Molyneux's answer I

William Molyneux (figure 1, left) is best known for the question he posed to John Locke (figure 1, right). Less attention has been given to the answer Molyneux provided and to his other visual enquiries. In fact, he asked the question twice, in slightly different forms, and it was the second one that Locke answered. The first question was posed in a letter to Locke on 7 July 1688 in response to Locke's *Essai philosophique concernant l'entendement* (Locke 1688). Molyneux's interest in the question was a consequence of his wife's blindness, and in the letter he wrote:

"A Man, being born blind, and having a Globe and a Cube, nigh of the same bignes, Committed into his Hands, and being taught or Told, which is Called the Globe, and which the Cube, so as easily to distinguish them by his Touch or Feeling; Then both being taken from Him, and Laid on a Table, Let us Suppose his Sight Restored to Him; Whether he Could, by his Sight, and before he touch them, know which is the Globe and which the Cube? Or Whether he Could know by his Sight, before he stretch'd out his Hand, whether he Could not Reach them, tho they were Removed 20 or 1000 feet from Him? If the Learned and Ingenious Author of the Forementioned Treatise think this Problem Worth his Consideration and Answer, He may at any time Direct it to One that Much Esteems him." (De Beer 1978, pages 482–483)

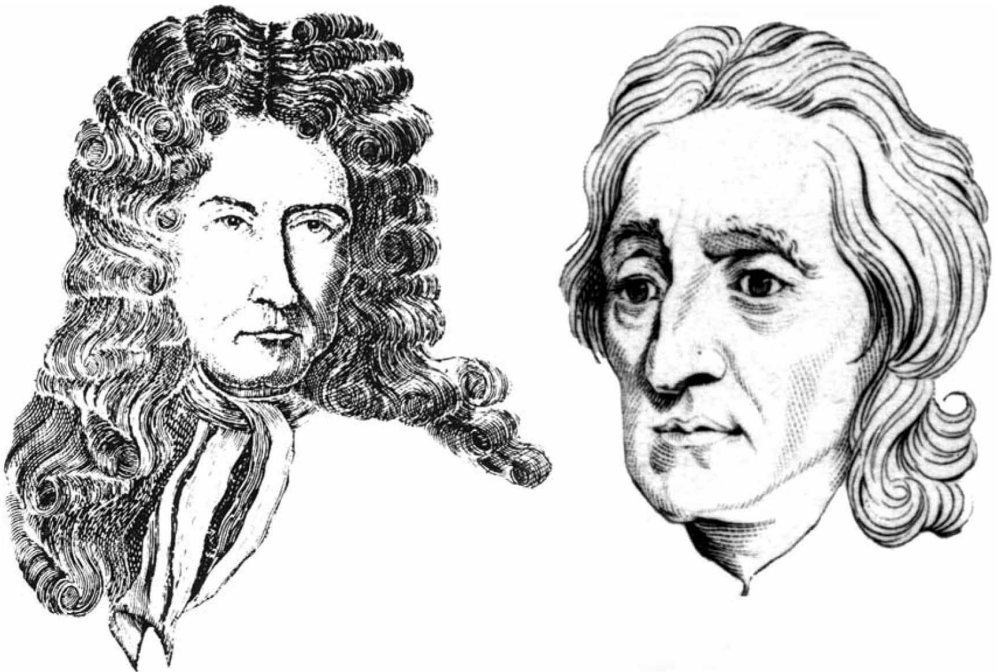


Figure 1. Left, William Molyneux (1656–1698) after a frontispiece engraving in Molyneux (1698). Right, John Locke (1632–1704) after an engraving in *The Historic Gallery of Portraits and Paintings*, Volume 4 (London: Vernor, Hood, and Sharpe, 1809).

It would seem that Locke did not at that time consider the problem worthy of his attention, as he did not reply to Molyneux's letter. Locke's *Essay Concerning Humane Understanding* was published in 1690, and it was praised in fulsome terms by Molyneux in his own *Dioptrica Nova*, which was published two years later. For example he wrote

that Locke “has rectified more Mistakes, and delivered more profound Truths, established on Experience and Observations... than are to be met with in all the Volumes of the Antients”. This might have been the spur to their further correspondence which started in 1692. Molyneux repeated his question regarding vision following blindness in a long letter to Locke on 2 March 1693; it was concerned mainly with additions to the second edition of Locke’s *Essay*. Molyneux introduced the question in a characteristically modest way: “I wil conclude my tedious lines with a Jocose Problem, that, upon Discourse with several concerning your Book and Notions, I have proposed to Diverse very Ingenious Men, and could hardly ever Meet with One that at first dash would give me the Answer to it, which I think true; till by hearing My Reasons they were Convinced” (De Beer 1979, page 651). Locke (1694) printed Molyneux’s question, and also Molyneux’s answer to it, in the second edition of his *Essay Concerning Human Understanding*; it was in almost the same words as written by Molyneux in his letter:

“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 the same bigness, so as to tell, when he felt one and 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. Quære, Whether by his sight, before he touch’d 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 obtain’d 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.” (Locke 1694, page 67, original italics)

Empiricist philosophers, like Locke, argued that we learn to perceive visual space by associating it with touch and muscular movement. This remained an issue of theoretical interest until Molyneux provided the spur to resolve a question of empiricist philosophy by resort to empirical observations. This has become known as Molyneux’s Question, and it has stimulated considerable interest and speculation ever since it was initially stated (see Gregory 2003; Gregory and Wallace 1963; Morgan 1977; von Senden 1960).

Locke readily printed both Molyneux’s question and his answer because he was in agreement with the latter: “I agree with this thinking Gent ... 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, whilst he only saw them: though he could unerringly name them by his touch, and certainly distinguish them by the difference of the Figures felt” (Locke 1694, pages 67–68). The answers of Molyneux and Locke, like that of Berkeley a few years later, were negative on theoretical grounds, but some years later post-surgical evidence was brought to bear on the argument. One such case was reported by Grant (see Morgan 1977), but the most celebrated operation was performed by William Cheselden (figure 2). As Voltaire was to note of Cheselden, he was “one of those famous surgeons, who unite a great extent of knowledge with dexterity in operations” (Morgan 1977, page 23). Cheselden (1728) carried out a number of informal tests on the vision of the operated boy in order to determine what could be discriminated. The distances, sizes, and shapes of objects could not be differentiated. Moreover, pictures of objects provided particular problems for perception, and it took about two months before they were recognised as representations of other objects. He was aware that blindness from cataract was not complete:

“Tho’ we say of the Gentleman that he was blind, as we do of all People who have Ripe Cataracts, yet they are never so blind from that Cause, but that they can discern Day from Night; and for the most Part in a strong Light, distinguish Black, White, and Scarlet; but they cannot perceive the Shape of any thing ... When he first saw, he was so far from making any Judgment about Distances, that he thought all Objects whatever

touch'd his Eyes (as he express'd it) ... He knew not the Shape of any thing, nor any one thing from another, however different in shape, or Magnitude; but upon being told what Things were, whose Form he before knew from feeling, he would carefully observe, that he might know them again." (Cheselden 1728, pages 447 – 448)

There was never any question amongst the philosophers whether the person with sight restored would be able to see post-operatively, but only whether they could name objects by sight alone. Physicians, on the other hand, were faced with the practicalities of vision in those with sight restored. In the early nineteenth century attention was drawn to the uniqueness of Cheselden's case, and the difficulties they had in making similar general statements from their own experiences.



Figure 2. William Cheselden (1688 – 1752) after an illustration in Richardson (1900).

William Molyneux was born in Dublin on 17 April, 350 years ago. He was educated at Trinity College Dublin, and graduated in 1674. He then spent three years in London studying law but his principal interests were in optics and astronomy. He was able to pursue these subsequently upon receiving an inheritance from his father. Optics and astronomy were combined in his analysis of the moon illusion (Molyneux 1687). With the invention of more powerful optical instruments in the seventeenth century astronomers provided detailed measurements of the dimensions of celestial bodies. Molyneux gave the angular dimensions of the full moon and estimated its perceived dimensions at zenith as "about a foot broad. But the same Moon being Looked upon just as she rises, she appears to be three or four foot broad" (1687, page 315). His *Dioptrica Nova. A Treatise of Dioptricks in two Parts* published in 1692, six years before his death, covered a much broader range of phenomena. It is said to be the first book on optics printed in English.

Molyneux's question has stimulated investigations many times since it was first enunciated, for example the case of SB, reported by Richard Gregory and Jean Wallace in 1963. Sydney Bradford was probably blind from birth, noted at the age of 10 months, with corneal opacity due to birth infection. He received a transplant cornea when he was 52 years of age. The study of his vision started in the hospital at the time of the operation, and continued until his death a few years later. SB had immediate vision for objects already known to him by touch, but other things were seen as patterns rather than objects. He had immediate perception of depth horizontally, but not

vertically—apparently from experience of walking though not climbing. For example, looking down from his high hospital window, he thought his feet would touch the ground if he hung from the window frame; but he judged the distances of chairs and tables in the ward with remarkable accuracy. He was able to draw objects from touch memory. He had normal colour vision (from the Ishihara test), though had almost no visual-distortion illusions. It was poignant that he did not like the appearance of his wife's face, or his own in a mirror! Although he had useful vision he was unable to drive a car (which upset him) and he became generally depressed, so in the end this was a personal tragedy.

Molyneux's question has resurfaced recently in the remarkable case of Mike May (Fine et al 2003), whose recovery has been charted with the armoury of modern psychophysics and imaging methods. Despite the insights derived from contemporary investigations into the question posed by Molyneux, the answer he proposed remains questionable. Nonetheless, it is to some other aspects of perception that he addressed that we will turn next.

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