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Edited by Desmond M. Clarke

Excerpt

[More information](#)

An Essay towards a New Theory of Vision

3rd edition 1732

The Contents

Section

- 1 Design
- 2 Distance of itself invisible
- 3 Remote distance perceived rather by experience than by sense
- 4 Near distance thought to be perceived by the angle of the
'optic axes'
- 5 Difference between this and the former manner of perceiving
distance
- 6 Also by diverging rays
- 7 This depends not on experience
- 8 These the common accounts, but not satisfactory
- 9 Some ideas perceived by mediation of others
- 10 No idea which is not itself perceived can be the means
of perceiving another
- 11 Distance perceived by means of some other idea
- 12 Those lines and angles mentioned in optics are not themselves
perceived
- 13 Hence the mind does not perceive distance by lines and angles
- 14 Also because they have no real existence
- 15 And because they are insufficient to explain the phenomena
- 16 The ideas that suggest distance are 1st the sensation arising from
the turn of the eyes
- 17 Betwixt which and distance there is no necessary connexion

Cambridge University Press

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Excerpt

[More information](#)

Philosophical Writings

- 18 Scarce room for mistake in this matter
- 19 No regard had to the angle of the optic axes
- 20 Judgment of distance made with both eyes, the result of experience
- 21 2ndly. Confusedness of appearance
- 22 This the occasion of those judgments attributed to diverging rays.
- 23 Objection answered
- 24 What deceives the writers of optics in this matter
- 25 The cause, why one idea may suggest another
- 26 This applied to confusion and distance
- 27 3rdly. The straining of the eye
- 28 The occasions which suggest distance have in their own nature no relation to it
- 29 A difficult case proposed by Dr. Barrow as repugnant to all the known theories
- 30 This case contradicts a received principle in catoptrics
- 31 It is shown to agree with the principles we have laid down
- 32 This phenomenon illustrated
- 33 It confirms the truth of the principle whereby it is explained
- 34 Vision, when distinct and when confused
- 35 The different effects of parallel, diverging, and converging rays
- 36 How converging and diverging rays come to suggest the same distance
- 37 A person extreme purblind would judge rightly in the forementioned case
- 38 Lines and angles, why useful in optics
- 39 The not understanding this, a cause of mistake
- 40 A query proposed by Mr. Molyneux in his *Dioptrics* considered
- 41 One born blind would not at first have any idea of distance by sight
- 42 This is not agreeable to the common principles
- 43 The proper objects of sight, not without the mind, nor the images of anything without the mind
- 44 This more fully explained
- 45 In what sense we must be understood to see distance and external things
- 46 Distance and things placed at a distance, not otherwise perceived by the eye than by the ear
- 47 The ideas of sight more apt to be confounded with the ideas of touch than those of hearing are

Cambridge University Press

978-0-521-70762-6 - George Berkeley: Philosophical Writings

Edited by Desmond M. Clarke

Excerpt

[More information](#)

An Essay towards a New Theory of Vision

- 48 How this comes to pass
- 49 Strictly speaking, we never see and feel the same thing
- 50 Objects of sight twofold, mediate and immediate
- 51 These hard to separate in our thoughts
- 52 The received accounts of our perceiving magnitude by sight false
- 53 Magnitude perceived as immediately as distance
- 54 Two kinds of sensible extension, neither of which is infinitely divisible
- 55 The tangible magnitude of an object steady, the visible not
- 56 By what means tangible magnitude is perceived by sight
- 57 This farther enlarged on
- 58 No necessary connexion between confusion or faintness of appearance, and small or great magnitude
- 59 The tangible magnitude of an object more heeded than the visible, and why
- 60 An instance of this
- 61 Men do not measure by visible feet or inches
- 62 No necessary connexion between visible and tangible extension
- 63 Greater visible magnitude might signify lesser tangible magnitude
- 64 The judgments we make of magnitude depend altogether on experience
- 65 Distance and magnitude seen as shame or anger
- 66 But we are prone to think otherwise, and why
- 67 The moon seems greater in the horizon than in the meridian
- 68 The cause of this phenomenon assigned
- 69 The horizontal moon, why greater at one time than another
- 70 The account we have given proved to be true
- 71 And confirmed by the moon's appearing greater in a mist
- 72 Objection answered
- 73 The way wherein faintness suggests greater magnitude, illustrated
- 74 Appearance of the horizontal moon, why thought difficult to explain
- 75 Attempts towards the solution of it made by several, but in vain
- 76 The opinion of Dr. Wallis
- 77 It is shown to be unsatisfactory
- 78 How lines and angles may be of use in computing apparent magnitudes

Cambridge University Press

978-0-521-70762-6 - George Berkeley: Philosophical Writings

Edited by Desmond M. Clarke

Excerpt

[More information](#)*Philosophical Writings*

-
- 79 One born blind being made to see, what judgment he'd make
of magnitude
- 80 The *minimum visibile* the same to all creatures
- 81 Objection answered
- 82 The eye at all times perceives the same number of visible points
- 83 Two imperfections in the visive faculty
- 84 Answering to which, we may conceive two perfections
- 85 In neither of these two ways do microscopes improve the sight
- 86 The case of microscopical eyes considered
- 87 The sight admirably adapted to the ends of seeing
- 88 Difficulty concerning erect vision
- 89 The common way of explaining it
- 90 The same shown to be false
- 91 Not distinguishing between ideas of sight and touch, cause of
mistake in this matter
- 92 The case of one born blind proper to be considered
- 93 Such a one might by touch attain to have ideas of 'upper'
and 'lower'
- 94 Which modes of situation he would attribute only to things
tangible
- 95 He would not at first sight think anything he saw high or low,
erect or inverted
- 96 This illustrated by an example
- 97 By what means he would come to denominate visible objects, high
or low, *etc.*
- 98 Why he should think those objects highest which are painted on
the lowest part of his eye, and *vice versa*
- 99 How he would perceive by sight the situation of external objects
- 100 Our propension to think the contrary no argument against what
has been said
- 101 Objection
- 102 Answer
- 103 An object could not be known at first sight by the colour
- 104 Nor by the magnitude thereof
- 105 Nor by figure
- 106 In the first act of vision, no tangible thing would be suggested
by sight
- 107 Difficulty proposed concerning number

Cambridge University Press

978-0-521-70762-6 - George Berkeley: Philosophical Writings

Edited by Desmond M. Clarke

Excerpt

[More information](#)

An Essay towards a New Theory of Vision

- 108 Number of things visible would not at first sight suggest the like
number of things tangible
- 109 Number the creature of the mind
- 110 One born blind would not at first sight number visible things as
others do
- 111 The situation of any object determined with respect only to
objects of the same sense
- 112 No distance great or small between a visible and tangible thing
- 113 The not observing this, cause of difficulty in erect vision
- 114 Which otherwise includes nothing unaccountable
- 115 What is meant by the pictures being inverted
- 116 Cause of mistake in this matter
- 117 Images in the eye not pictures of external objects
- 118 In what sense they are pictures
- 119 In this affair we must carefully distinguish between ideas of sight
and touch
- 120 Difficult to explain by words the true theory of vision
- 121 The question, whether there is any idea common to sight and
touch, stated
- 122 Abstract extension inquired into
- 123 It is incomprehensible
- 124 Abstract extension not the object of geometry
- 125 The general idea of a triangle considered
- 126 Vacuum or pure space not common to sight and touch
- 127 There is no idea or kind of idea common to both senses
- 128 First argument in proof hereof
- 129 Second argument
- 130 Visible figure and extension not distinct ideas from colour
- 131 Third argument
- 132 Confirmation drawn from Mr. Molyneux's problem of a sphere
and a cube, published by Mr. Locke
- 133 Which is falsely solved, if the common supposition be true
- 134 More might be said in proof of our tenet, but this suffices
- 135 Farther reflection on the foregoing problem
- 136 The same thing does not affect both sight and touch
- 137 The same idea of motion not common to sight and touch
- 138 The way wherein we apprehend motion by sight easily collected
from what has been said

Cambridge University Press

978-0-521-70762-6 - George Berkeley: Philosophical Writings

Edited by Desmond M. Clarke

Excerpt

[More information](#)*Philosophical Writings*

-
- 139 *Qu.* How visible and tangible ideas came to have the same name if
not of the same kind
- 140 This accounted for without supposing them of the same kind
- 141 *Obj.* That a tangible square is liker to a visible square than to a
visible circle
- 142 *Answ.* That a visible square is fitter than a visible circle to
represent a tangible square
- 143 But it does not hence follow that a visible square is like a tangible
square
- 144 Why are we more apt to confound visible with tangible ideas than
other signs with the things signified
- 145 Several other reasons hereof assigned
- 146 Reluctancy in rejecting any opinion no argument of its truth
- 147 Proper objects of vision the language of the Author of nature
- 148 In it there is much admirable and deserving our attention
- 149 Question proposed concerning the object of geometry
- 150 At first view we are apt to think visible extension the object
of geometry
- 151 Visible extension shown not to be the object of geometry
- 152 Words may as well be thought the object of geometry as visible
extension
- 153 It is proposed to inquire what progress an intelligence that could
see but not feel might make in geometry
- 154 He cannot understand those Parts which relate to solids and their
surfaces and lines generated by their section
- 155 Nor even the elements of plane geometry.
- 156 The proper objects of sight incapable of being managed as
geometrical figures
- 157 The opinion of those who hold plane figures to be the immediate
objects of sight considered
- 158 Planes no more the immediate objects of sight than solids
- 159 Difficult to enter precisely into the thoughts of the
above-mentioned intelligence
- [160 The object of geometry, its not being sufficiently understood, cause
of difficulty and useless labour in that science]¹

¹ The final section was omitted in the 1732 editions.

Cambridge University Press

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Excerpt

[More information](#)*An Essay towards a New Theory of Vision***An Essay towards a New Theory of Vision**

1 My design is to show the manner wherein we perceive by sight the distance, magnitude, and situation of objects. Also to consider the difference there is betwixt the ideas of sight and touch, and whether there be any idea common to both senses.

2 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.²

3 I find it also acknowledged that the estimate we make of the distance of objects considerably remote is rather an act of judgment grounded on experience than of sense. For example, when I perceive a great number of intermediate objects, such as houses, fields, rivers, and the like, which I have experienced to take up a considerable space, I thence form a judgment or conclusion that the object I see beyond them is at a great distance. Again, when an object appears faint and small, which at a near distance I have experienced to make a vigorous and large appearance, I instantly conclude it to be far off. And this, it is evident, is the result of experience; without which, from the faintness and littleness, I should not have inferred anything concerning the distance of objects.

4 But when an object is placed at so near a distance as that the interval between the eyes bears any sensible proportion to it, the opinion of speculative men is that the two optic axes (the fancy that we see only with one eye at once being exploded) concurring at the object do there make an angle, by means of which, according as it is greater or lesser, the object is perceived to be nearer or farther off.^a

5 Betwixt which and the foregoing manner of estimating distance there is this remarkable difference: that whereas there was no apparent, necessary connexion between small distance and a large and strong appearance, or between great distance and a little and faint appearance, there appears a very necessary connexion between an obtuse angle and

^a See what Descartes and others have written on this subject [Descartes, *Dioptrics*, Sixth Discourse, in *Oeuvres*, VI, 130–47; N. Malebranche, *The Search after Truth*, trans. T. M. Lennon and P. J. Olscamp (Cambridge: Cambridge University Press, 1997), Book I, Chs. vi–ix, pp. 25–47].

² Cf. William Molyneux, *Dioptrica Nova: A Treatise of Dioptricks, in Two Parts* (London: Tooke, 1692), p. 113: 'For *Distance* of it self, is not to be perceived; for 'tis a Line (or a Length) presented to our Eye with its End towards us, which must therefore be only a *Point*, and that is *Invisible*.'

Cambridge University Press

978-0-521-70762-6 - George Berkeley: Philosophical Writings

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Excerpt

[More information](#)*Philosophical Writings*

near distance, and an acute angle and farther distance. It does not in the least depend upon experience, but may be evidently known by anyone before he had experienced it, that the nearer the concurrence of the optic axes, the greater the angle, and the remoter their concurrence is, the lesser will be the angle comprehended by them.

6 There is another way mentioned by optic writers, whereby they will have us judge of those distances, in respect of which the breadth of the pupil has any sensible bigness. And that is the greater or lesser divergency of the rays, which issuing from the visible point do fall on the pupil, that point being judged nearest which is seen by most diverging rays, and that remoter which is seen by less diverging rays. And so on, the apparent distance still increasing as the divergency of the rays decreases, till at length it becomes infinite when the rays that fall on the pupil are to sense parallel. And after this manner it is said we perceive distance when we look only with one eye.

7 In this case also it is plain we are not beholding to experience: it being a certain, necessary truth that the nearer the direct rays falling on the eye approach to a parallelism, the farther off is the point of their intersection, or the visible point from whence they flow.

8 [Now though the accounts here given of perceiving near distance by sight are received for true, and accordingly made use of]³ in determining the apparent places of objects, they do nevertheless seem very unsatisfactory, and that for these following reasons.

9 It is evident that when the mind perceives any idea, not immediately and of itself, it must be by the means of some other idea. Thus, for instance, the passions which are in the mind of another are of themselves to me invisible. I may nevertheless perceive them by sight, though not immediately, yet by means of the colours they produce in the countenance. We often see shame or fear in the looks of a man, by perceiving the changes of his countenance to red or pale.

10 Moreover it is evident that no idea which is not itself perceived can be the means of perceiving any other idea. If I do not perceive the redness or paleness of a man's face themselves, it is impossible I should perceive by them the passions which are in his mind.

³ The phrase in parentheses was given as follows in the 1709 edition: 'I have here set down the common, current accounts that are given of our perceiving near distances by sight, which though they are unquestionably received for true by mathematicians, and accordingly made use of by them ...'

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Excerpt

[More information](#)*An Essay towards a New Theory of Vision*

11 Now from section 2 it is plain that distance is in its own nature imperceptible, and yet it is perceived by sight. It remains, therefore, that it be brought into view by means of some other idea that is itself immediately perceived in the act of vision.

12 But those lines and angles, by means whereof some men 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. I appeal to anyone's experience whether, upon sight of an object, he computes its distance by the bigness of the angle made by the meeting of the two optic axes? Or whether he ever thinks of the greater or lesser divergency of the rays, which arrive at any point to his pupil?⁴ Everyone is himself the best judge of what he perceives, and what not. In vain shall any man 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.

13 Since, therefore, those angles and lines are not themselves perceived by sight, it follows from section 10 that the mind does not by them judge of the distance of objects.

14 The truth of this assertion will be yet farther evident to anyone that considers those lines and angles have no real existence in nature, being only an hypothesis framed by the mathematicians, and by them introduced into optics, that they might treat of that science in a geometrical way.

15 The last reason I shall give for rejecting that doctrine is, that though we should grant the real existence of those optic angles, *etc.*, and that it was possible for the mind to perceive them, yet these principles would not be found sufficient to explain the phenomena of distance, as shall be shown hereafter.

16 Now, it being already shown that distance is suggested to the mind by the mediation of some other idea which is itself perceived in the act of seeing, it remains that we inquire what ideas or sensations there be that attend vision, unto which we may suppose the ideas of distance are connected, and by which they are introduced into the mind. And *first*, it is certain by experience that when we look at a near object with both eyes, according as it approaches or recedes from us, we alter the disposition of our eyes by lessening or widening the distance between the pupils. This disposition or turn of the eyes is attended with a sensation, which seems

⁴ The 1709 edition included the following extra phrase here: 'Nay, whether it be not perfectly impossible for him to perceive by sense, the various angles wherewith the rays according to their greater or lesser divergence do fall on his eye.'

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978-0-521-70762-6 - George Berkeley: Philosophical Writings

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Excerpt

[More information](#)*Philosophical Writings*

to me to be that which in this case brings the ideas of greater or lesser distance into the mind.

17 Not that there is any natural or necessary connexion between the sensation we perceive by the turn of the eyes and greater or lesser distance, but because the mind has by constant experience found the different sensations corresponding to the different dispositions of the eyes to be attended each with a different degree of distance in the object, there has grown an habitual or customary connexion between these two sorts of ideas, so that the mind no sooner perceives the sensation arising from the different turn it gives the eyes, in order to bring the pupils nearer or farther asunder, but it withal perceives the different idea of distance which was wont to be connected with that sensation; just as upon hearing a certain sound, the idea is immediately suggested to the understanding which custom had united with it.

18 Nor do I see how I can easily be mistaken in this matter. I know evidently that distance is not perceived of itself. That by consequence it must be perceived by means of some other idea, which is immediately perceived and varies with the different degrees of distance. I know also that the sensation arising from the turn of the eyes is of itself immediately perceived, and various degrees thereof are connected with different distances, which never fail to accompany them into the mind, when I view an object distinctly with both eyes, whose distance is so small that in respect of it the interval between the eyes has any considerable magnitude.

19 I know it is a received opinion that, by altering the disposition of the eyes, the mind perceives whether the angle of the optic axes or the lateral angles comprehended between the interval of the eyes and the optic axes are made greater or lesser; and that accordingly, by a kind of natural geometry, it judges the point of their intersection to be nearer or farther off. But that this is not true I am convinced by my own experience, since I am not conscious that I make any such use of the perception I have by the turn of my eyes. And for me to make those judgments, and draw those conclusions from it, without knowing that I do so, seems altogether incomprehensible.

20 From all which it follows that the judgment we make of the distance of an object, viewed with both eyes, is entirely the result of experience. If we had not constantly found certain sensations, arising from the various disposition of the eyes, attended with certain degrees of distance, we should never make those sudden judgments from them concerning the distance of