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Molyneux's Question and the History of Philosophy

Edited by Gabriele Ferretti and Brian Glenney

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Rewriting the History of Philosophy

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The history of philosophy has undergone remarkable growth in the English language philosophical world. In addition to more and better quality translations of canonical texts there has been a parallel expansion in the study and research of sources, thinkers and subjects hitherto largely neglected in the discipline. These range from women philosophers and late ancient thinkers to new Western and non-Western sources alike. Simultaneously, there has been a methodological shift to far greater intradisciplinary and interdisciplinary perspectives in the history of philosophy, cutting across the humanities and social sciences.

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MOLYNEUX'S QUESTION AND THE HISTORY OF PHILOSOPHY

Edited by Gabriele Ferretti and Brian Glenney

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MOLYNEUX'S QUESTION AND THE HISTORY OF PHILOSOPHY

In 1688 the Irish scientist and politician William Molyneux sent a letter to the philosopher John Locke. In it, he asked him a question: could someone who was born blind, and able to distinguish a globe and a cube by touch, be able to immediately distinguish and name these shapes by sight if given the ability to see?

The philosophical puzzle offered in Molyneux's letter fascinated not only Locke, but major thinkers such as Leibniz, Berkeley, Diderot, Reid, and numerous others including psychologists and cognitive scientists today. Does such a question represent a philosophical puzzle or a problem that can be solved by experimental tests? Can vision be fully restored after blindness? What is the relation between vision and touch? Are the senses linked through learning or bound at birth?

Molyneux's Question and the History of Philosophy is a major collection of essays that explore the long-standing issues Molyneux's problem presents to philosophy of mind, perception and the senses. In addition, the volume considers the question from an interdisciplinary angle, examines the pre-history of the question, and aspects of it that have been ignored, such as perspectives from religion and disability.

As such, *Molyneux's Question and the History of Philosophy* presents a set of philosophically rich, empirically informed, and scientifically rigorous original investigations into this famous puzzle. It will be of great interest to students and researchers in philosophy, psychology, and the cognitive sciences including neuroscience, neurobiology and ophthalmology, as well as those studying the mind, perception and the senses.

Gabriele Ferretti is a NOMIS Fellow at the Eikones – Center for the Theory and History of the Image at the University of Basel, Switzerland.

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ACKNOWLEDGEMENTS

This is the first volume of papers dedicated to Molyneux's question, an over 300-year-old problem in the philosophy of perception that has enchanted some of the most influential figures from the history of the early modern period to today, all of which are discussed in some manner. It is with even greater pride that we announce new voices into this discussion, some of which even pre-date the origin of the question, but whose writings provide insight and intrigue beyond what was previously known.

Our process for including these new voices was pretty simple and straightforward: at a conference in Croatia we quickly compiled a list of topics and issues, finding contributors who, to our surprise, mostly said yes and the project moved along on schedule. The result will be judged by the continued relevance and interest in Molyneux's question, though we are as editors proud of the result and do think that this is a significant contribution to the field of the history and continued work in the philosophy of perception.

We are extremely grateful to our contributors for their excellent work, who took the comments seriously and far exceeded our suggestions. We are equally grateful to the Editors of the Rewriting the History of Philosophy Series in which this volume appears, Pauliina Remes and Aaron Garrett, for inviting us to edit this volume and gave us pretty much free rein on what to do.

In addition, Gabriele Ferretti's work was supported by a NOMIS Fellowship, awarded by the Eikones – Center for the Theory and History of the Image at the University of Basel, Switzerland.

Finally, we would like to thank the Philosophy Editor at Routledge, Tony Bruce, and his helpful assistant, Adam Johnson. We hope to have repaid their trust and patience with our enthusiasm.

We both wish to dedicate this volume to our dear families for their support and encouragement, particularly our parents whose sacrifices made our work in philosophy possible.

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Peter West recently completed a PhD at Trinity College Dublin on Berkeley's epistemology. He is now working on a project tracing "anti-representationalist" thought throughout the seventeenth and eighteenth centuries in thinkers such as John Sergeant, Berkeley, and Thomas Reid. Along with Manuel Fasko, he co-won the 2019 Colin and Ailsa Turbayne International Berkeley Essay Prize.

Delighted

climbing rolling hills
my hands and feet, both bare
fondle roots and stones
my body warmed by rays of sun

walking flowering fields
my nostrils revel in the divine
perfume of jasmine, the sweetness
of exuberant flowering roses

strolling around the marketplace
my ears rejoice at the haggling
giggling and calling, the ringing
of coins, a children's song

settled down in my moss green garden
my tongue is caressed by the taste
of freshly baked bread, salty cheese
grapes and pomegranates

at night, lying on my silky soft bed
my lips taste the desirous skin of my beloved
I hear a noble hart, whispers of the wind
the warbling of a nightingale
and feel grateful and delighted

Marjolein Degenaar

GENERAL INTRODUCTION

Gabriele Ferretti and Brian Glenney

Dublin July. 7. 1*688*
A Problem Proposed to the Author of the Essai Philosophique concernant L'Entendement

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 stretchd 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 Forementiond Treatise think this problem Worth his Consideration and Answer, He may at any time Direct it to One That Much Esteems him, and is

His Humble Servant
William Molyneux
High Ormonds Gate in Dublin. Ireland

Locke did not respond to Molyneux's letter, no doubt distracted by his five years of political exile. As Marjolein Degenaar describes in Chapter 8 of this volume, Locke was hiding under the pseudonym "Dr. van der Linden" in Holland, being searched for as "Jan Lock, wel eer Secretaris van Mylord Shaftesbury." He was also distracted by finalizing both his major political and epistemological treatises: *A Letter Concerning Toleration* (1689), *Two Treatises of Government* (1689), and the *An Essay Concerning Human Understanding* (1689/90), the last of which would be of great consequence to Molyneux and his question.[1]

Though Molyneux's first letter is otherwise inconsequential, it is the first manifestation of "Molyneux's question"—whether a person born blind might visually identify tactually familiar shapes immediately upon receiving sight. A more careful formulation that removed the part about relative distances was to be published in the second edition of Locke's to-be-famous *Essay*, and then again and again by some of the greatest minds of the early modern period: Leibniz (1760), Berkeley (1709), Voltaire (1738), Diderot (1749), Adam Smith (1795), among many others.

After Locke returned home to England, he and Molyneux began an exchange of cheerful letters prompted by Molyneux's effusive praise of Locke in the dedication of his 1692 optical treatise *Dioptrica Nova*. Molyneux's fourth letter, dated 2 March 1693, over five years after he initially proposed his problem, contains what today is considered "Molyneux's question:"

> 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. It is this.
>
> *Suppose a Man born blind, and now adult, and taught by his touch to distinguish between a cube and a sphere (suppose) of ivory, nighly 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; quære, whether by his sight, before he touched them, he could now distinguish and tell, which is the globe, which the cube?* I answer, *not; for though he has obtain'd the experience of, how a globe, and 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.*
>
> But of this enough; perhaps you may find some place in your essay, wherein you may not think it amis to say something of this problem.
>
> *Letter to John Locke, 2 March 1693. In de Beer (ed.) 1979*

Locke responded within the month: "Your ingenious problem will deserve to be published to the world" (28 March 1693, in de Beer (ed.) 1979).

This volume adds 20 essays to the 300-plus year history of answers to Molyneux's question, a history that stands in need of significant reappraisal given numerous criticisms, particularly of late. We present these essays in this general introduction, organized around the following five criticisms:

(1) Molyneux's appropriation of the question from another source;
(2) the encouragement of bias against people with blindness, a social failure called ocularism;
(3) a lack of specificity resulting in ambiguity as to what might count as a satisfying answer;
(4) a crude generality that belies the underlying complexity of vision and touch;
(5) the incapacity to be experimentally testable, though presumably designed to be so.

A look at the literature on Molyneux's question also shows that in spite of these criticisms, or perhaps because of them, work on Molyneux's question has never been more prevalent than today (see Figure 0.2).

The origin story of Molyneux's question

The remarkable publication of Molyneux's question in Locke's *Essay* gives only a partial account of the question's beginnings—Locke's *Essay* was *at most* an inspiration for the design of the question. In fact, some have speculated (Degenaar & Lokhorst 2014) that Molyneux's question was not original to him. Molyneux may have cribbed it from an allegory told 500 years

previously, in a work entitled (ironically, if true) *Philosophus Autodidactus* or *The Self-Taught Philosopher* (in Arabic, Hayy Ibn Yaqẓān) by Ibn Tufayl (c. 1105–1185):

> [I]magine a child growing up in a certain city, born blind, but otherwise intelligent and well endowed, with a sound memory and an apt mind. Through his remaining channels of perception he will get to know the people as well as all sorts of animals and objects, and the streets and alleys, houses and markets—eventually well enough to walk through the city without a guide, recognizing at once everyone he meets. But colors, and colors alone, he will know only by descriptive explanations and ostensive definitions. Suppose after he had come this far, his eyesight were restored and he could see. He would walk all through the town finding nothing in contradiction to what he had believed, nor would anything look wrong to him. The colors he encountered would conform to the guidelines that had been sketched out for him. Still there would be two great changes, the second dependent on the first: first the daybreak on a new visual world, and second, his great joy.
>
> *Ibn Tufayl (1972), 97, 7–8*

Lenn Goodman argues in Chapter 2, however, that there is no indication that Molyneux read Ibn Tufayl. "Ibn Tufayl stood in the background here, of course, but less for saying that the blind cannot know colors and more for what he represented … a life of open inquiry" (Chapter 2). In addition, Ibn Tufayl's allegory entails a "yes" answer to Molyneux's question based on empiricist leanings shared by Molyneux, leanings that even inspired Molyneux's question.

According to Goodman, Ibn Tufayl's central influence on Molyneux was exerted indirectly through support of the experiential basis for knowledge, independent of authority, which fostered a culture of experimental inquiry in Molyneux's time. This culture influenced Molyneux's founding of the *Dublin Philosophical Society* (1683), translating the works of the "New Learning" of Galileo and Descartes, and the publishing of many papers in the Royal Society's *Philosophical Transactions,* including his own textbook, *Dioptrica Nova* (1692). This context is no doubt one of at least three constitutive elements that led to the question's design.

Another reason to doubt that Molyneux borrowed from Ibn Tufayl's allegory is the existence of cases that discuss how sight and touch relate that predate Molyneux's own question. As Giulia Scalas explains in Chapter 1 of this volume, "Empiricism and Molyneux's question," we find the Epicurean poet, Lucretius (99 BCE–c.55 BCE), writing in his most famous work *On Nature*, likely known to Molyneux, that:

> [I]f we feel a square object in the dark and receive the impression of a square, what in the light will be able to give us the visual impression of a square, except the image of the object? It is evident therefore that images are the cause of vision, and that without them nothing could be seen.
>
> *DRN III vv. 230–239. Tr. Smith 2001*

Could Lucretius have been Molyneux's source of inspiration? Though, there is no "blind man," Lucretius's answer is at least in parallel to Molyneux's own answer: one must *learn* how the images of sight and touch relate before they might identify previously touched objects as those currently seen. Hence, Lucretius' "dark impressions" seem better suited as inspiration for Molyneux's question and answer than Ibn Tufayl's allegory.

There was likely no volume of *The Self-Taught Philosopher* to consult, though the proto-empiricist writings of Lucretius and Ibn Tufayl, among others, were percolating in Molyneux's

time. In addition, as the essay by Manuel Fasko and Peter West for this volume suggests, Irish intellectuals during Molyneux's time frequently referred to humanity's lack of knowledge of God to be analogous to the lack of knowledge of light and color in people born blind (Chapter 7). Could such an analogy, perhaps itself drawn from Ibn Tufayl's allegory, have influenced Molyneux in his design of the problem?

We can also imagine another, more personal, origin story to Molyneux's question. Molyneux seems to have applied his experimental techniques to his personal concern for his wife Lucy's late-onset blindness, which started a few months after their marriage. As Molyneux's biographer writes, after seeing several optical specialists Molyneux diagnosed Lucy's condition as a brain disease rather than a problem with her eyes (Simms, 1982, 22). In addition, Molyneux believed that this disease was specific to sight alone as Lucy's condition led to her increasing handiness. "[S]he diverted herself with music and with handiwork, in which she developed remarkable dexterity" (Simms, 1982, 21–2). Could it be the sense-specificity of Lucy's brain disease, in combination with Molyneux's experiments on optical problems in *Dioptrica Nova* and elsewhere, that led him to his famous question? However, if we restrict the influence of Molyneux's question to these two elements alone, then we cannot clearly explain why Molyneux did not publish his question in his own book of problems, *Dioptrica Nova* (1693).

Nicholas Wade describes *Dioptrica Nova* in Chapter 9 as an assortment of proposed solutions to problems in optics and vision, including Molyneux's conjecture, later borrowed by Helmholtz (1925) without attribution, that touch explains why our visual experience is not inverted though we see with an inverted retinal image. How? Touch educates our "looking" at objects. Wade writes that for Molyneux, "seeing referred to the stimulation of the retina whereas looking involved an awareness of the objects in direct vision" (Chapter 9). Given this problem-based content, Molyneux could just as well have published his question there, particularly as it seems within the scope of his answer to inverted images, where touch reaches beyond its sensory province to the eyes.

A likely third element of influence must be included—Molyneux's reading of the pages of Le Clerc's journal, *Bibliothèque universelle et historique* (6 February 1688), open to the abstract of Locke's *Essay*. The influence of Locke's *Abregé* on the question's origin is more strongly suggested by Molyneux's intention to publish it in Locke's *Essay*. Was the *Abregé* what finally led to Molyneux's "Eureka!"?

If the abstract to Locke's *Essay* was Molyneux's final piece to designing his question, we should know the precise section, as the abstract did not include the specific passage where Locke was to interpose Molyneux's question, a passage that discusses perceptual learning—how a single-colored sphere is first seen as a circle colored variously (see King 1829, 365–399). Which section of the abstract produced the spark? The editor of Locke's letters, E. S. De Beer, could not be correct: "His problem appears to be loosely connected with *Abregé*, II.vii" (De Beer 1978, 6–10). For, as Scalas notes in her essay for Chapter 1 of this volume, Locke claims there that ideas of shape *can* be grasped by several senses. She quotes the *Abregé* as follows:

> Outre celà il y en a d'autres [idées] qui viennent à l'Esprit, par plus d'un sens, comme le mouvement, le repos, l'espace, les figures, qui nous viennent par la Vue et par l'Attouchement.
>
> *Locke 1688, 52*

The *Abregé* contains no discussion of the sense-specificity of shape. Thus, if it was to be an influence on Molyneux's design of his question, we should interpret Molyneux's original 1688 letter to Locke as a *criticism* of this passage rather than agreement with another passage—we should

interpret Molyneux's question to be born out of opposition to Lockean empiricism. If Locke was aware of this, we should read Locke's insertion of Molyneux's "ingenious" question in his discussion of perceptual learning, a novel context for Molyneux's question not intended by Molyneux himself, as Locke's genteel, yet critical, response.

Though we cannot fully know the origin of Molyneux's question, we do know that Locke's publication of it, including Locke's "no" answer based on perceptual learning, brought Molyneux's question to a fuller profundity. So did its publication by fellow Irishman George Berkeley in his *Towards a New Theory of Vision* (1709) and Berkeley's "no" answer based on the senses being fundamentally different sources of knowledge. Similarly, the question's appearance in Diderot's speculations about a mathematician that was blind, Dr Saunderson, in his *Letter on the Blind for the use of those who can see* (1749), and every different context where the question has been published subsequently, have offered an insight which generations of thinkers have elaborated and animated, including those within the essays of this volume.

"The blind" and ocularism

To this account of the origin story of Molyneux's question, which so far includes three elements influencing its design, i.e. Molyneux's adept experimentalism, Lucy's cognitive blindness, and Locke's *Abregé*, we wish to interpose a fourth constitutive element: ocularism, a socio-historical bias against people with blindness. As both essays in Part II of this volume argue, in addition to previous work discussed in Part II's introduction, the fertile ground of empiricism where Molyneux's question was instigated and propagated is also where ocularism is most readily cultivated and affirmed—where to be deficient in a sensory ability is to deficient in knowledge of the world. In other words, a deficit paradigm follows from empiricism, a paradigm that Simon Hayhoe describes in Chapter 10 as, "the belief that blindness and other impairments cause cognitive, intellectual and ethical deficits, and that the study of perception provides evidence of this deficit" (Chapter 10). What evidence? Hayhoe argues that when blindness is treated as a topic of investigation it is studied as a "taxonomy" that overgeneralizes the condition, subjugating the individuals who are viewed as mere categorizations of it:

> [T]he way taxonomies of blindness were defined, classified and developed during the early years of the Enlightenment was governed by evolving ontologies and competing paradigms. These paradigms created a single taxonomy of human experience which became known as "the blind man."
>
> *Chapter 10*

The very place where ocularism was most readily present was in the very context of the origin of Molyneux's question—in Molyneux's own experimental work and the empirical leanings of his generation. Molyneux's own privilege as a sighted person is reflected in his pronouncement of what he, a sighted person, thinks it is like to be a person with blindness.

The lab-like conditions of Molyneux's question are at once born from Molyneux's experimental background and simultaneously his ocular bias. Georgina Kleege's essay for Chapter 11, "The Molyneux cult," attempts to convey what such a context is like to a person with a kind of blindness. It is as if, she writes, there is a cult of belief that a person with blindness is lacking in knowledge and ability, a cult that proceeds with its assumptions in the very testing of their presumption. After all, Molyneux's question is asked of people with sight, not of those without it whom, one might presume, would not be capable of answering given an assumed gap in knowing what visual experience is like. Kleege narrates the poke and prod of hypothetical

experimentalist cult leaders as they investigate their hypothetical blind person—which of course has effects on the social realities of people with blindness. The scientists create a square and circle out of plastic rods and ask, "which of these would you say best represents the sphere and which the cube?" (Chapter 11). Kleege responds from her own perspective—from the perspective of a person with blindness—within the context of the scientists' and philosophers' cultish fetish:

> She examines the board and finds that he has drawn a circle and a square. How can any of this represent what the objects feel like? These are lines on a flat surface, when the objects have volume, depth, temperature, texture. It's as if they think you feel things with your fingertips alone. Because she's beginning to pity them for their deprived state, she takes a new sheet and makes marks. The cube is easier. She jabs at the board eight times to imitate the sharp corners. The jabbing makes a small pucker in the plastic, which is not quite sharp enough, but she supposes it might suggest something. For the sphere, she sweeps the stick around the board in a swoopy undulation she hopes will be suggestive of the way the curves of the sphere conform to the curves of her cupped palms.
>
> The silence as they examine her handiwork is stunning and profound. But then they begin to chatter and cluck amongst themselves. She surmises that she has once again gotten the answer wrong. There is really no satisfying these people.
>
> *Chapter 11*

We have devoted Part II of this volume to the consideration that the experimental culture that no doubt provided a crucial context for the formation of Molyneux's question also included a worrisome socio-historical bias against people like Lucy, who was ironically another element of influence on the origin of Molyneux's question.

No specificity, no satisfaction

> A survey of the special problems of eighteenth century epistemology and psychology shows that in all their variety and inner diversity they are grouped around a common center…the problem which Molyneux first formulated...
>
> *Cassirer 1951, 108*

> [T]he two great mythical experiences on which the philosophy of the eighteenth century had wished to base its beginning: the foreign spectator in an unknown country, and the man born blind restored to light.
>
> *Foucault 1997, 65*

Cassirer and Foucault's claims that Molyneux's question served as an Archimedean point of early modern epistemology and mind are not wrong, but there was little competition. Like problems in other areas, such as Copernicus' cosmological problem of planetary orbit, to which Newton dedicated his calculus and theory of gravitation, or Al Hazen's earlier optical problem of the inverted retinal image, to which Kepler, Da Vinci, and Descartes, and Molyneux himself, sought solutions, Molyneux's question served as partner in the creation of a new knowledge industry, a branch in what we now call Psychology. The list of attempts at fixing upon a solution to Molyneux's question is so vast, one gets the sense that something methodological is amiss. The

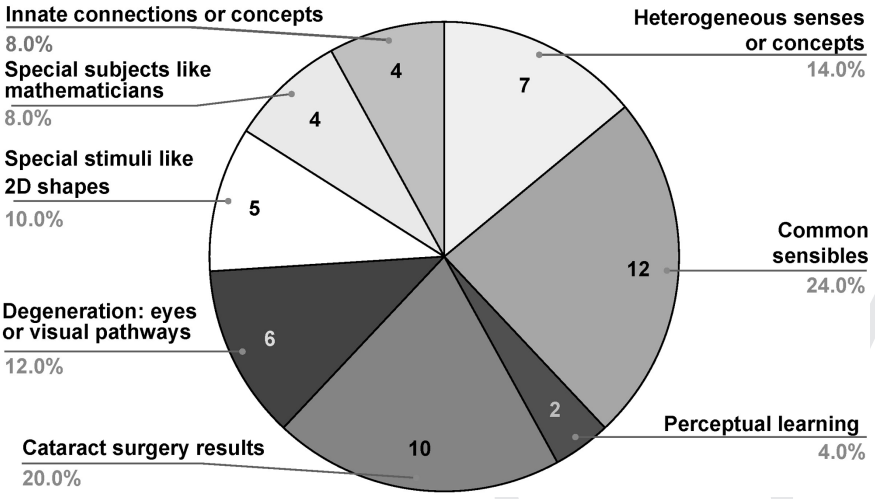

Figure 0.1 Kinds of answer to Molyneux's question

conclusions and arguments are diverse: a priori, biographical, empirical, theoretical, etc., as are the answers, involving adaptations from different shapes to different subjects, and from unique contexts to distinctive theoretical assumptions. Figure 0.1 provides a snapshot of this diversity within fifty of the most commonly discussed answers to Molyneux's question, which employ eight distinct kinds of answer, each with a distinctive use.

Twenty-five of the "yes" answers are based on:

Special subjects: e.g. geometers, hypothetical subjects lacking neural degeneration
Nativism: e.g. innate neural connections between senses, innate bodily dispositions
Special stimuli: e.g. braille dots, 2D shapes
Common sensibles: e.g. shape concepts or experience shared by sight and touch.

Similarly, 25 "no" answers are based on:

Heterogeneity: e.g. the senses or ideas they produce are fundamentally dissimilar
Learning (perceptual): e.g. visual ability requires time and experience to see
Degeneration: e.g. neural connections in visual cortex are not usable in newly sighted
Cataract experiments: e.g. empirical tests on newly sighted prove a "no" answer.

Note also that while the essays in this volume by Shaun Gallagher (Chapter 14) and Bence Nanay (Chapter 15) would have you believe that "no" answers dominate the field, there may be an even split between "yes" and "no" answers. See Figure 0.2 for another visual demonstration of this tie ~~of~~ some of the most influential answers across time.

Figure 0.3, in the Appendix, charts the specific details of these 50 "yes," "no," and "pluralist" answers to Molyneux's question.

A balance in the number of yes and no answers to Molyneux's question over three centuries of debate suggests that the problem remains unanswered to the satisfaction of philosophers. This invites the question which forms the title of Chapter 20, by Cohen and Matthen, "What was Molyneux's question a question about?" We might add: if answered, what does it answer? What

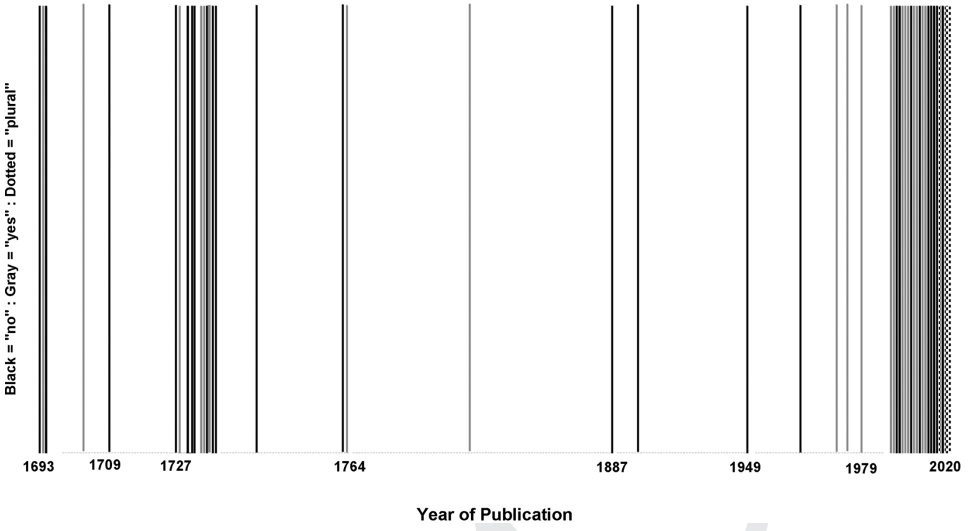

Figure 0.2 Timeline of 50 answers to Molyneux's question

specific philosophical view is supported by a "yes" answer as opposed to a "no?" That these questions exist suggests that there is a problem with Molyneux's question itself, stated above in our third criticism of Molyneux's question, that it lacks specificity, creating ambiguity as to what might count as a satisfying answer.

This ambiguity is exemplified by the fact that Molyneux's question is ill-fitted to disprove or prove Locke's empiricism, that ideas are all initially acquired from the senses. In fact, the question assumes that ideas are from the senses, that shape is acquired by the senses rather than by some inborn geometrical knowledge. For, prior to sight, the person born blind is "taught by his touch" and then asked to distinguish the shapes "by his sight alone."

Furthermore, as Gallagher argues in Chapter 14, we cannot answer Molyneux's question in a satisfying way if we add non-empiricist components. If the role of knowing shapes by touch while blind must play into the newly sighted's ability to identify the shapes by sight alone, then claiming that shape ideas are inborn common sensibles cannot answer Molyneux's question. In addition, reason cannot play an active role in the touch-to-sight transfer, as this would require more than a sensory exchange of the shape idea. Rather, we must have an empiricist constraint that concerns the experience of shape as fundamental. Perhaps the best description of the core empiricism constraining Molyneux's question is recently set out by Naomi Eilan (2019) as follows:

> [W]e need to show that the additional ways we introduce of characterising the sense in which experiences of shape are objective which are being claimed to apply to both modalities, thereby serving to secure unity, can be shown to be internal, in some way, to the phenomenology of each modality.
>
> *Eilan 2019*

Many answers to Molyneux's question are equally ambiguous relative to the theory they purportedly support. For instance, we might charitably read Molyneux's own answer as drawing from, rather than assuming empiricism. As his answer appears in Locke's *Essay*:

> 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.
>
> *Essay II.ix.8*

However, empiricism itself cannot support Molyneux's assumption that the ideas of shape acquired by sight and touch are different. Rather, it would presumably support their sameness. In fact, Locke counts shape, what he calls "figure," as an idea acquired by both sight and touch.[2] So, why require, as Molyneux's answer suggests, a further experience of seeing and touching a cube simultaneously—a kind of intermodal experience?

As Daniel Schneider points out in Chapter 3, Spinoza holds a view similar to Locke's claim that shape is a common sensible: "all bodies involve the concept of one and the same attribute [extension]" (*Essay* II L2dem) (Chapter 3). However, as Schneider cautions, it is possible in Spinoza's view to possess different representations of the same concept of extension. If the representations of extended shapes are different, a correlation between them must be learned, a view we also find in Locke about vision itself.

As mentioned above, Locke inserts Molyneux's problem just after his discussion of how sensations are "often changed by the judgment." Our experience of a sphere is indeed "improved" over time and experience:

> [a] flat Circle variously shadow'd, with several degrees of Light and Brightness coming to our Eyes … frames to itself the perception of a convex figure and an uniform colour.
>
> *Essay II.ix.8*

In other words, what we initially see when viewing a sphere is a flat but shaded circle, much like what an artist would paint to depict a sphere, which we *learn* to judge as a three-dimensional sphere. Hence, the newly sighted would fail to see the same three-dimensional shapes known previously by touch until a kind of *intramodal* experience within vision itself—the visual experience of a circle variously colored agreed with a visual experience of a sphere of one color—supplemented the newly sighted's judgement of the shapes (for more, see Vaughn 2018). In other words, both Molyneux and Locke answer "not" for different reasons, suggesting that while they share "not" answers, these answers are actually two different answers altogether.[3]

Thus begins a tradition of puzzling out this question by nearly every philosopher who considered the problem of idea acquisition, from Berkeley to Foucault, a diversity of answers to which this volume adds those who did not explicitly comment on Molyneux's question: Anton Amo and Damaris Masham, and those that preceded it: Epicurus, Spinoza, Amo, and Cavendish. In addition, we have a special treat from Degenaar in Chapter 7: answers from teenagers who had no previous knowledge of Molyneux's question, many of which echo those of the most influential philosophers. Other answers are of interest for their uniqueness such as Diderot (1749): "no" for three-dimensional shape perception, "yes" for two-dimensional shape perception. Reid (1764) agrees, adding that if the three-dimensional shape is observed by a newly sighted person knowledgeable in geometry, then "yes." On a first impression, this tradition of many answers is interesting *because* of its diversity. However, one also gets the impression that these diverse answers talk past each other without settling on what the question is about and how exactly one might go about answering it.

This second impression has generated additional worry. As Robert Hopkins writes:

> [I]t is far from obvious what Molyneux's question is really about. What issue, or issues, of a more general and theoretical nature, does it raise? Since this is unclear, it is also unclear whether Molyneux's question still matters today.
>
> *Hopkins 2005, 441*

Others state a similar concern from the perspective of finding an adequate experimental paradigm for testing Molyneux's question, given our knowledge of the relationship between perception and action. For instance, Ghazanfar et al. (2008) worry as follows:

> [N[eural representations across the brain may be centered on specific actions. This view on neural representations puts "Molyneux's Problem" in a new light. Unisensory signals are fused into multisensory motor representations unified by an action, but since Molyneux does not suggest any action, his "problem" may be better viewed as an ill-posed question—at least from a neuroscientific perspective.
>
> *Ghazanfar et al. 2008*

These philosophers and neuroscientists might be understood to be provoking a kind of explanatory dilemma: either Molyneux's question concerns a specific issue of importance, in which case only a chosen few answers are relevant, or it is a general query with issues too diverse to address with a single analysis making it a problem of less importance.

This worry is compounded somewhat in the study of conjectured answers to Molyneux's question, such as those in this volume on Epicurus, Spinoza, Amo, and Masham. For instance, consider Meyns' view that this study can produce insight into a particular philosopher's view, a "spirit of investigating the counterfactually plausible about what Amo *might* have responded to Molyneux, I suggest we can get greater insight into Amo's philosophical commitments, in particular regarding sensation and cognition" (Chapter 4). The investigation must identify the specific feature of Molyneux's question that might be anticipated by the author being studied. For Amo, the feature of Molyneux's question that is informative is how the senses are distinguished, his being a unique view grounded on a spectrum of obscurity: vision surpasses the other senses in "clarity" whereas "The *perceptibles of touch* have *maximum* obscurity" (Amo 1738, 76; Chapter 4). Hence, upon gaining new sight, it is unlikely that the "dense" ideas of shape from touch can provide a basis for educating vision, leaving a potential "negative" answer in the wings.

By contrast, we find Scalas arguing for an emphasis on shape memory in Epicurus' anticipated answer, a "stored notion" that may or may not transfer from touch to sight and furthermore may or may not be activated by the visual appearance of the shape—the question comes down to whether such memories are "intermodal" in nature. And again, with Spinoza we find an emphasis on another distinct feature: whether shape representations that minds fabricate of the shape "extension" are intermodal. A similar difference may exist for Masham's unique combination of Locke and Platonism: ideas must be acquired from experience, whereas one's mental faculties such as perception and reason are inborn. For instance, the love of God requires that we first experience the pleasure of loving others around us: "[I]f we lov'd not the Creatures, it is not conceivable how we should love God" (Masham 1696, 62). But what are ideas of shape for the newly sighted? Are they simple ideas that can be utilized at first sight? Or are they, like the notion of love, to be acquired first by experience? Hence, Masham's answer may come down to the nature of shape ideas and the mechanism by which they are acquired: are they directly

received via sensory experience or facilitated by reason? Thus, as argued above, Molyneux's question is answered in a satisfying way if it conveys a specific problem, but to answer that specific problem is really to answer a sub-problem in a set of sub-processes involved in answering the question as a whole. We might individuate the senses using Amo's unique "obscurity" condition, but we also need a theory of the nature of the memories created by these senses as suggested by Epicurus and whether these are intermodal or not. And even then, we need to understand how these memories become activated at first sight, and to what extent they might be used to distinguish and identify the shapes.

Too general to matter

What began as a light-hearted, "jocose" question some 300 years ago has helped initiate greater appreciation and understanding of the complexity of the mind. To put it bluntly, there is no satisfactory answer to Molyneux's question, one that answers specifically what is clearly too general a question to specify. Another way to put the problem is that there is no general question to be answered, but rather a plurality of more specific sub-questions that shift with every turn and variable (Glenney 2013). Bence Nanay argues in Chapter 15 for an even more granular reading—since every newly sighted subject is different, every answer to the question is individual, what is a "yes" for subject A would be a "not" for subject B even in the same external conditions. This helps to explain why hundreds of empirical tests to the question have failed at a solution (von Senden 1960): the question cannot be empirically tested as a general experiment (Degenaar 1996), a problem we turn to below and is the specific concern of Part III of this volume.

The coarse-grainedness of Molyneux's question and answer also rings dull to contemporary ears—lacking in controls for distinctions between concept, vehicle, and content (Millikan 1991). Certainly, the question is naïve, its original form is a historical curiosity located at the birth of modern scientific inquiry that today is but a graveyard of other coarse-grained ideas. In a word, Molyneux's question is not a question about anything—there is no taxonomy of "the blind man" (see Part II of this volume), much less a general state of being "blind" or "newly sighted" (Glenney 2013, Ferretti 2017). And answers, if fine-grained enough to be pertinent to today's discipline-specific methodology, cannot be in response to this original question. And yet, there has never been more published research on Molyneux's question than in the last few decades. It is a startling fact, one made more powerful by considering how "bunched up" the answers look in Figure 0.2 in the period from the 1990s until the present day. We do not know exactly why this is so, other than that the curse of the question's generality may be, in turn, a blessing for its productivity. We thus turn to a potential reason as to why the question remains popular: its history.

This volume has the explicit aim of showing that the contemporary interest in Molyneux's question springs from a long and broadening history of trying to understand the knowledge gained from the senses—a history that goes well beyond the seventeenth century and "western" thought. This compilation of essays by a diversity of authors explores Ancient, Medieval, and African philosophical answers to Molyneux's question, as well as the influential ideas of women and people with disabilities. As such, this volume aims to further broaden the historical canon of answers to Molyneux's question to include alternative philosophical traditions and voices.

This volume also disrupts an often observed focus on getting the "correct" answer to Molyneux's question or distilling its "true" meaning. It is the diversity of engaging ideas to understand complex brain structures, specific mental states, and variegated conceptual tools to analyze them that promotes a pluralist reading of the question arrived at separately but favored

corporately by your editors (see Glenney 2013, Ferretti 2017, 2019a). What these essays present, along with the inventiveness and acuity of their writers and the philosophers discussed, is that we still know so little about the world in which we live and the means we have for acquiring knowledge of it, especially when it comes to perceptual knowledge, perhaps due to a mind evolved with different functions for many different tasks altogether, or the significant limitations of our own sensory apparatus that let us perceive the world "as a worm shut up in one drawer of a cabinet" (Locke, *Essay* II.ii.3).

While Molyneux's question was birthed during the revolution of empirical discovery and methodology, empiricism was, ironically, skeptical of knowledge gained from the senses. Deepening the irony is that previous historical contexts, particularly the Ancient and Medieval periods, granted more trust in our cognitive systems despite being significantly viewed as divine revelation, a kind of non-sensory and non-rational acquisition of knowledge. This contrast is highlighted by the comparison between Ibn Tufayl's allegory which is optimistic about what people born blind might know, including colors in some form, and the Irish theologians of Molyneux's time who were fundamentally skeptical that people born blind could know or even conceive of the ideas of light or color.

Irish theologians of Molyneux's time, like Peter Browne, used the "blind man" and his failure to conceptualize ideas of light and color to account for the failure of knowing the Christian mysteries and divine attributes. As Fasko and West summarize, "our knowledge of the divine attributes is as ill-informed as a blind man's knowledge of the objects of sight" (Chapter 7). Thus, to reason about the limits of what the blind man can know is to reason about what God's intelligent creatures might know of the divine. We even find Berkeley referring back to his own answer to Molyneux's question in his claim against Browne that our knowledge of God is greater than that of, "one born blind can of light and colours" (Alciphron 1732, 171). So significant was the use of this comparison that Berman (2005) has described Molyneux's question and its negative answer as the "root metaphor" of Early Modern Irish philosophy.

Similarly, Ancient versions of empiricism, like that of Epicurus, were generally more skeptical about knowledge acquired from the senses. As Giulia Scalas argues in Chapter 1 of this volume, just as Molyneux demanded perceptual learning of how objects seen connect to objects touched, so too would Epicurus, resulting in an implied "not" answer. As Scalas writes:

> As Molyneux explains well, the person must understand that what is visually perceived as a corner, from a tactile point of view produces a sensation of angularity and that a form of correspondence is created between these two sensations. In the case of Epicurus, recognition is not possible at the level of sensations. In fact, because the sensations are a-rational and without memory they have an immediate validity and cannot compare to, evoke or correct each other. The visual sensation cannot, therefore, recall a previous tactile sensation.
>
> *Chapter 1*

Compare this to Ibn Tufayl's allegorical tale discussed above of a blind boy who "knows color" by touch alone, one that some think anticipates Molyneux's own problem. Ibn Tufayl's optimism about the abilities of the senses is consistent with the Early Medieval context in which he writes, even to the point of claiming that, in some sense, people with blindness can know color, and reidentify each at first sight. But this optimism that began as mere conjecture has not manifested itself in experimental settings: there is no clear case of a person born blind who has immediately identified tactually familiar shapes by sight alone, though hundreds of attempts

have been made. But this may be more a failure of the experimental approach than a failure to match the sight of shape with its previous feel.

Blindness, sight restoration, and Molyneux's miracle

> [H]e spat on the ground, and made clay of the spittle, and he anointed the eyes of the [born] blind man with the clay and said unto him, go, wash in the pool of Siloam. He went his way therefore, and washed, and came seeing.
>
> *John 9:5–21*

Molyneux's question concerns blindness and visual restoration. Historically, blindness and its healing are often a narrative device to convey the *lack* of knowledge humans have of a deity (See Chapters 2 and Chapter 7 in this volume; Glenney and Noble 2014). Today, medical cures for blindness are purported to convey the opposite: humanity's increased knowledge in medical science. However, what happened in the pool of Siloam is a possibility that science cannot yet reach: *complete* and *immediate* sight restoration from congenital blindness. Not only does the possibility of such a restoration pose experimental problems, but it also confronts us with several conceptual conundrums about what it means to have vision restored, particularly as it relates to the problem of what it means to ask Molyneux's question, much less give an answer. As Cheng writes regarding the ideal situation for Molyneux's question in Chapter 18, "The subject is made to see by magic, as it were" (Chapter 18). Without *scientific* magic, or a miracle, we remain ignorant of a satisfactory answer to Molyneux's question. With our present knowledge of the visual system, the situation proposed by Molyneux is so difficult that it seems biologically impossible to create a Molyneux subject: given the problems concerning what Molyneux's question is really about, there are several issues standing in the way of such a scientific miracle.

Surely, the scenario would require at least two significant scientific miracles: one to heal cognitive confusion and another to clear optical occlusions (Glenney and Noble 2014), since, as we shall see, visual processing can be impaired, and blindness can manifest, in several ways (Glenney 2013; Ferretti 2017, 2019a). These scientific miracles are needed to empirically test the "at first sight" desideratum for answering Molyneux's question—a final common criticism of the question as mentioned above, as this desideratum is, as we shall see above, very problematic. As Occelli writes of the question's failure, "the absence of developmental vision permanently undermines the processes by which humans interact with the world, even when sight is eventually restored" (Chapter 13).

Much contemporary work on Molyneux's question is an attempt to reconcile the research concerning current experimental paradigms of sight restoration with the question, taking account of its philosophical complexity. This is the focus of Part III. The diverse and multiple processes involved in restored vision and its eventual correlation with touch is presented below as needing a series of numerous and complex scientific miracles. Each of these relates to a sub-question of Molyneux's question, revealing required aspects of restoration currently unavailable to medical (vision) science. In addition, it is also not clear how to properly handle the conceptual complexity of these diverse constraints in order to answer Molyneux's question.

In what follows, we list some sub-problems we have at the moment, the scientific miracles we need in order to resolve them, and the problems with constraining the variables involved in each needed scientific miracle—variables explored in greater detail in Occelli's Chapter 13. This will allow the reader to appreciate some of the known conceptual problems, the experimental

difficulties and the biological limitations that the complexity of Molyneux's question poses to our knowledge of the human mind and perception.

In sum, as the reader shall see, the experimental application of Molyneux's question shows more of the complexity of vision and its development, given the plasticity of our brain and its singular aspects, than a pathway to an answer. As Occelli suggests, "Indeed, the scientific approach has demonstrated that the variability observed in plasticity processes poses the challenge to identify the different factors involved in such processes, by clarifying their individual and reciprocal impact" (Chapter 13). If so, this makes such a question both the nightmare and the bench test of research in vision science and philosophy of vision.

Yet, if we embrace a naturalistic philosophical perspective, then there exists a common agreement that an answer to this philosophical question both relies on and belies the empirical results from vision science. In this respect, even if the appropriate scenario is hard to reach, philosophical reflection and scientific attempts have developed enough to provide *near appropriate* experimental settings. Is there a "near-enough" experimental paradigm? Some have been proposed (Held et al. 2011; Chen et al. 2016; see also Fine et al. 2003) and recently criticized (Schwenkler 2013; Cheng 2015; Ferretti 2017, 2019a).

A new strong naturalistic candidate presented in this book is from Gallagher's Chapter 13, concerning a more pragmatic version of the question. Though different from the original question, it relies on testing the shape of a newly sighted subject's hand grasp: would the grasp appear prepared to be reaching for a round or angled object?

> On a table in front of the newly sighted subject there are two apples, one a piece of fruit, and the other an iPhone. One should ask the newly sighted subject to hand one of the objects to the experimenter; and then the other object. The shape of the subject's hand just prior to grasping the object will tell us whether she is able to distinguish the shape of the object by her sight, before she touches them.
>
> *Chapter 14*

Gallagher continues with how to interpret the results, yes or no:

> […] if her visually guided grasps are appropriately shaped to the objects prior to touching them, then there is some very basic level (rather than some appropriate level of abstraction) where sensory-motor contingencies operate intermodally, and the answer to the Molyneux question (or at least this version of it) is "yes". On the other hand, as far as I can see, if her grasp is not well-formed in relation to the relevant object, the answer has to be "no".
>
> *Chapter 14*

Gallagher's experiment is told in the context of the realization that vision is both a pragmatic and active process, as well as a complicated set of sub-processes, subserved by two different visual streams, the dorsal stream for visually guided action and the ventral stream for object recognition (Milner and Goodale 2006). As previously suggested by Gallagher (2005) and then further discussed by Ferretti (2017), such a model can be used in order to frame Molyneux's question in the light of vision science today. Thus, according to Gallagher, it is also the framework for a possible test concerning whether the content of representations in the dorsal stream—responsible for how we are disposed to act under certain motor conditions—are common for sight and touch in Molyneux's subjects (cf. Ferretti 2017 and Ferretti, Chapter 17). Gallagher (2005) has already suggested to analyze Molyneux's

question about action (see also Glenney 2013; Jacomuzzi et al. 2003). Ferretti (2017) also extends this enquiry in the light of the model by Milner and Goodale (2006) with further evidence from experimental tests (Chen et al. 2016; Fine et al. 2003; Held et al. 2011), analyzing the problems of testing the question concerning recognition and the one on action in a neuroscientific-based framework, and offering skepticism toward a possible "yes' answer to both.

In this respect, in his Chapter 17, Ferretti further extends such an enquiry on Molyneux's question in action and analyzes, in the light of new speculations on the nature of vision-for-action, whether a subject could form correct action representations toward the shape presented, at first sight, after vision is restored from blindness. In general, while this action paradigm for testing Molyneux's question has yet to be realized in the laboratory, the philosophical speculation on the available evidence suggests that a positive answer is very problematic, and depends on several theoretical and empirical constraints on sight restoration.

Another naturalistic angle is the claim that vision science provides insight into the nature of perceptual judgment and the related requirement of perceptual learning, as suggested by Locke's own answer. Toribio goes so far as to claim, on the basis of the two visual systems analysis of Molyneux's question provided by Ferretti (2017), that perceptual learning is:

> [A] necessary condition for making the wheels of perception even begin to move and does it in a way that ties perceptual learning to specific sensory modalities so as to allow for memory-stored representations of characteristic looks, characteristic smells, characteristic feels, etc. regardless, again, of how we build our theory of concepts and concept possession.
>
> *Chapter 16*

Hence, the lack of an experimental paradigm provides support for a theory of perception advocated in Locke's own answer. This suggests, as Toribio goes on to claim, the newly sighted may indeed initially experience a sphere as a circle variously colored. But, as Ferretti cautions:

> [O]nly an empirical test will be able to tell us what is the correct response … [and] in order to run such tests, we need to first understand what it means to restore "vision" in its different shades and use such a knowledge to guide experimentation in the lab, in the light of our best conceptual reflections on what vision science tells us about vision.
>
> *Chapter 17*

These chapters show how even very specific experimental paradigms, concerning specific visual tasks, invoke several conceptual and empirical challenges for a proper realization of the conditions to test Molyneux's question concerning sight restoration. However, the challenges in reaching an experimental scenario—an enterprise that, we may think, could be ruled out by biological constraints—may not be a matter of principle as we have been arguing, but rather our present-day lack of knowledge of the biology of vision.

In this respect, as we shall see, the several attempts to reach a satisfactory experimental scenario have failed for different reasons, often lacking an assessment of the effectiveness of visual restoration (Ferretti 2017, 2019a). This is because, indeed, we effectively lack concrete criteria of what "visual restoration" really means, and this is even reflected in our linguistic practices concerning perceptual verbs referring to visual states, as Brogaard et al. argue in Chapter 12. Why? Vision is a very complex phenomenon, and sometimes our language, as well as our naïve approach to its definition, even definitions used in our labs when verifying the visual status of

subject to be tested, does not do justice to this complexity. In fact, we may fail to appreciate how uniquely complex vision is unless we consider cases where its absence, or at least its believed absence, is laid out before us. One example of the marvelous complexity of vision, especially when it comes to investigating Molyneux's question, is offered by Glenney in Chapter 19, in the context of cases where people with blindness from birth fail to report visual illusions when taking psychedelic drugs, even though neural and psychophysical evidence suggests they are experiencing them. How might we reconcile this? Glenney argues that LSD *does* produce visual illusions in people with blindness from birth, but due to the novelty of sight, people with blindness "cannot identify sight as such" (Chapter 19). Sight is unique and cannot be identified until one has learned what it is to experience it. Chapter 19 concludes with some potential training regimes based on exotic sensory variations of Molyneux's question for those who were once blind to prepare for the uniqueness of new sight. The confusion that results from the complexity of vision suggests that there remains much work to be done on Molyneux's question at the conceptual level, even for experimental purposes.

In this respect, when taking into account these problems, and bearing in mind what the question is really about, we need to properly define what constraints we must consider concerning the visual status of the subject tested. A common distinction is made to identify the kind of visual discrimination demanded by Molyneux's question (Gallagher 2005; Schwenkler 2013; Ferretti 2017, 2019a):

(M1) Can Molyneux's subject see the shapes, in the sense of being able to make a sufficient "visual discrimination" concerning the distinction between the shapes?
(M2) If Molyneux's subject *can* make a sufficient "visual discrimination" concerning the distinction between the shapes, so as to "form robust representations of visual shape" (Schwenkler 2013: 93), can she recognize them?

For instance, in the latest empirical attempt by Held et al., they state that Subjects "must exhibit acuity sufficient to discriminate visually among the objects used for testing" (Held 2009: 585), a version of M1. Yet, as Schwenkler points out, the newly sighted must be able to do more, they must visually discriminate in a way that is sufficient for shape cross-modal matching (Schwenkler 2013: 92), a version of M2 (see Ferretti 2017).

M2 is the condition of visual discrimination at stake in Molyneux's question (see the discussion by Gallagher 2005 of Degenaar 1996 and Evans 1985; see also Ferretti 2017). But asking M2 requires a positive answer to M1, making M1 a necessary but not itself a sufficient condition as Held (2009) suggests (see Ferretti 2017). Yet, we cannot even answer M1 without acknowledging the existence of, and trying to confront, the myriad of different forms of blindness, as well as of different visual states with different functions, as discussed above.

For one, blindness can be both ocular and cortical: due to a malfunctioning or impairment of some feature in the eyes (i.e., of the ocular processing due to cataracts or corneal lesions, etc.) or to a malfunctioning or impairment of the processing at some stage in the visual cortex (Milner and Goodale 1995/2006, Ch. 3; Gallagher 2005; see also Cattaneo and Vecchi 2011). As Ferretti suggests (2019a, 2017) the empirically based conceptual distinction between *ocular* and *cortical blindness* leads to a crucial point for empirical tests of Molyneux's question. Indeed, even assuming that ocular vision/processing could be effectively restored, visual restoration of cortical areas for visual processing is not likely to be restored, and thus neither would visual discrimination of the M1 variety be possible. Cortical visual processing requires development over time for its proper functioning: visual learning through proper training. In addition, such

learning is largely based on the active coupling with the environment (Noë 2004, 5; O'Regan and Noë 2001; Gangopadhyay and Kiverstein 2009, 69–70; see also Sacks 1995, 114, § 6; Ferretti 2017, 2019).

Accordingly, Glenney (2013) suggests that causes for failing to recognize shapes is likely due to residual effects of either optical or cognitive blindness (2013, 544). This point is in line with the idea by Noë (2004, 12) that, usually, blind subjects are "double blind", i.e. perceptually and cognitively. This suggests a new methodology for answering Molyneux's question, following studies about the different specific processing of different visual areas (Downing et al. 2006; Farah 2004; Cattaneo and Vecchi 2011), and about cognitive delays in visual processing that can be related to the processing we find at the Intermediate-Levels (for example, visual areas V1–V5) or at the Higher Levels (Glenney 2013, 543–544). In principle, following Glenney (2013), we could analyze Molyneux's question concerning each level of visual processing individuated by Marr's (1982) famous computational theory of vision.

In this respect, we can have as many different questions with respect to as many different streams of visual processing, and their related functions for different visual tasks. And we could find out, in the light of our best neuroscientific theories of vision, that each question poses different problems (Ferretti 2017):

> Thus, the number of ways to see and the variety of kinds of visual deprivation all directly related to the physical level alone suggest that there are a number of ways in which the newly sighted might both succeed and fail in shape recognition.
>
> *Glenney 2013, 543–544*

With this caveat of the complexity of vision in mind, we turn to some philosophical approaches to Molyneux's question found in Part IV, which concern the multiform aspect of such a question (Glenney 2013), such as from the final chapter, Chapter 20, by Cohen and Matthen, which investigates what Molyneux's question is really about, and generalizes beyond the traditional narrow focus on visual discrimination of shapes. They ask a version of M2: "How are ideas formed in each modality, and, given how they are formed, what cross-modal correspondences can we expect to find?" (Chapter 20). The rationale of their attempt is that:

> Molyneux's question is not about the particular experiences that a newly sighted man suffers when he looks at a globe. Rather, it is about this man's ability to apply a general idea that he obtained by touch to visual experience. Since general ideas omit certain features of particular experiences, we have to ask whether the retained characteristics are inter-modally comparable.
>
> *Chapter 20*

Molyneux's question thus transforms into a methodology for considering the intermodality of other crucial features of perception: the location of objects, inverted faces, and direction of object motion, a continuation of Cohen and Matthen (2019), and other attempts at investigating different versions of Molyneux's question (Gallagher 2005; Glenney 2013; Ferretti 2017; Jacomuzzi et al. 2003).

Cohen and Matthen focus on the philosophical methodology of Molyneux's question, signifying a difference between considering "yes" answers that indirectly abstract from relevant data like face perception and direct-seeming empirical "no" answers like those from cataract subject

experiments. This methodological distinction is made by Gallagher in his contribution to this volume, based on his 2005 paper, where he writes:

> (1) the in-principle or ideal answer, which is "yes", which would apply only in the situation were all empirical ambiguities are eliminated and where no neural deformations are present, and (2) the empirical answer, which is "no" and seemingly applies to any real case.
>
> *Chapter 14*

On Gallagher's view, the empirical "no" that we discussed above is different from the historical and theoretically based "no", which assumes that sensory processes are not originally intermodal but that intermodal connections depend on postnatal visual and tactile experience. Rather, the empirical "no" is based specifically on the empirical and neural complications that prevent the patient from distinguishing shapes. The in-principle or ideal "yes" answer is based on the idea that, absent the empirical and neural complications, sensory processes are intermodal, evidence for which is found in neonate behavior (e.g., Streri 2003, Meltzoff & Borton 1979).

At this point, our review begs the question: do empirical and theoretical methodologies cross-pollinate? Gallagher argues they do. "Empirical studies, however, do present a challenge to any "yes" answer" (Chapter 14) (For example, as discussed in his essay for this volume, Gallagher argues that sensory-motor theories, particularly by Noë, are inadequate for answering Molyneux's question, "something close to a category mistake" (Chapter 14). Why? Empirically speaking,

> the specifics of sensory-motor contingencies related to touch are different from those of vision. Indeed, one is tempted to say that there is no level of abstraction that would appropriately remain a level of sensory-motor contingency where these contingencies are similar.
>
> *Chapter 14*

Given Gallagher's argument, any theoretical considerations of M2 are hostage to its empirical application. In other words, any answer to Molyneux's question depends on knowing that visual discrimination is successfully restored when the shapes are being identified, a positive answer to M1. This ensures the optimal conditions of visual processing for reliable testing.

But, as argued above, a problem is that restoration is, (a) very difficult to substantiate and, (b) it is not immediate as required by Molyneux's question, but slow and, in most of the cases, cannot be complete, even after a long time period (Jacomuzzi et al. 2003, 260–262; Fine et al. 2003; Smith 2000: 497; Maurer et al. 2005; for a recent review see, Ferretti 2017, 2019a). For example, the experimental test on cataract surgery subjects as soon after surgery as possible has to be immediate or, "ideally when bandages are first removed" (Held 2009, 595), so that the test is performed "at first sight." However, in this critical period of recovery we cannot distinguish between optical, cortical and cognitive delays due to the post-operative trauma, and the effects of perceptual learning are not clear. So, we do not effectively know whether the experimental situation is effectively achieved (Jacomuzzi et al. 2003: 262). In fact, the delay of visual restoration, which is gradual, may be significant, as we know that visual neurophysiological problems after surgery are significant and complex (Gallagher 2005; see also Degenaar 1996; Smith 2000; Ferretti 2017, 2019). In spite of that lack of criteria for distinguishing recovery from delays, empirical attempts continue to answer Molyneux's question by trying to restore vision and test as quickly as possible (Held et al. 2011; Held 2009; Chen et al. 2016), a flawed paradigm (Ferretti 2017, 2019a) according to Brogaard et al. in Chapter 12.

That said, the "temporal immediacy" constraint of Molyneux's question concerning testing "at first sight" is not achievable experimentally. Why? Eye use in order to shape cortical visual

representations is needed during ontogenetic development. But testing *at first sight* prevents any cortical visual processing to be completely restored, processing that depends on the proper *training* needed to develop accurate functioning in visual object recognition. How? For one, as said above, training is largely based on the active visual experience of the environment (Ferretti 2017, 2019). Furthermore, there is a specific critical period of recovery after which cortical visual processing involved in object recognition cannot be restored anymore (for a review see Gallagher 2005; Ferretti 2017). Thus, if we investigate Molyneux's question by using subjects who have overcome the critical period, and relatedly do not receive visual stimulation for purposes of recovery, then such empirical research is flawed—a "no" has little bearing on the question the more it approximates the question's protocol of "at first sight." This only suggests that, after the critical period, visual restoration, related to positively answering M1, is not possible, while not excluding that, even before the critical period, achieving visual restoration may be very difficult. This does not directly answer Molyneux's question, *a là* M2, but just says that we cannot reach a proper experimental setting, as we cannot satisfy the constraint posed by M1 (Ferretti 2017, 2019a). Note too that cortical visual processing involved in visual recognition cannot be restored, in general, as easily as ocular processing can, and that even when ocular processing is restored, the subject shows the same visual impairment as brain-damaged subjects with different lesions of the visual cortex (see Gallagher 2005; Ferretti 2017), in particular, specific forms of *visual agnosia*, i.e. of impairment in visual recognition (Ferretti 2017, §6).

In this respect, Occelli's Chapter 12 explores these claims on visual restoration with greater specificity, discussing a wide variety of experimental results concerning visual deprivation, the possibility of recovery, and vision after blindness. The studies discussed by Occelli suggest that:

> a distinction should be made between rudimentary visual skills, whose underpinning neural mechanisms retain their functionality later in development, and mid-level visual skills, such as region integration via figural cues, which are visually driven developmental processes requiring functional vision in the first few years of life.
>
> *Chapter 13*

Furthermore, "not only basic visual skills, but also more complex visual processes related to image parsing are recoverable after prolonged delay" (Chapter 13). What does this mean for Molyneux's question? Her analysis suggests that the experimental analogues to Molyneux's question are more about the evolution of sight recovery than the shape experiences being transferred from touch.

For instance, these experiments suggest that reorganizational processes involved in sight recovery after prolonged visual deprivation are possible, such that "some exuberant connections are just inhibited rather than eliminated during development and can be unmasked to cope with environmental changes" (Chapter 13). However, in line with what we have said up to now about the relation between vision, action, and movement, we also learn that movement is crucial in both tactile and visual discrimination of shapes. As Cheng argues in his analysis of somatosensory spaces in Chapter 18:

> [B]oth of these two senses also rely heavily on both perceivers' and objects' movements: it is *possible* for both sight and touch, to be sure, to detect objects' shapes and sizes without obvious movements. However, it always significantly helps if either the perceiver or the object in question moves during the process (Schwenkler 2013).
>
> *Chapter 18*

Since the Molyneux subject's movements are usually constrained during visual testing, presumably to prevent perceptual adaptation prior to testing, the processes of reorganization are inhibited and the question itself is not answerable by empirical testing (again, it is not clear whether movement would be permitted, in the light of the perceptual learning fostered by it, perceptual learning being a problem for the constraints on Molyneux's question, see Ferretti 2017).

Summing up, it seems that theoretical considerations of Molyneux's question must consider empirical results, which are in turn inhibited by the question's conceptual constraints. This makes Molyneux's question unique as a thought experiment: neither wholly theoretical nor empirically resolvable. As Cheng writes, "the status of Molyneux's question, *qua* thought experiment, is situated in-between Putnam's twin earth (logically and metaphysically possible only) and Jackson's Mary (logically, metaphysically, nomologically, and technically possible)" (Chapter 18). So, as Degenaar anticipated in 1996 and these recent studies confirm, the possibility of successful restoration of visual processing is the most insidious and problematic aspect standing in the way of its resolution.

The reader may argue that, maybe, the constraint that the test should be performed "as soon after surgery as possible" (Held 2009: 595) is too demanding and strong. We could then avoid the constraint of *temporal immediacy* and use another constraint of *epistemological immediacy* introduced by Levin (2008; for discussion see also Glenney 2013; Ferretti 2017): we should allow the subject to heal "between visual restoration and shape recognition, while assuring, through controls, that subjects remain experientially and inferentially naïve regarding identifying shapes by sight alone" (Glenney 2013: 460). Unfortunately, what seems to be a more reasonable constraint on restoration might be very hard to apply—given biological constraints, we cannot dispose of a criterion that guarantees complete healing of the visual system without the risk of acquisition of perceptual learning (Jacomuzzi et al. 2003; Ferretti 2017, 2019). This may be, however, because, given the problems exposed above and by Chapter 12 of defining the nature of "visual restoration", there is no clear definition of "what it is to see", and what is the relation between different visual states, a definition that is promoted, as we have seen, by an answer to M1 and M2 above (Ferretti 2017, 2019a).

What is vision?

When talking about restoration of sight (or vision), we need to explain what we mean by "sight" and "vision" so as to be clear about what we mean by its restoration, about what state we are restoring. As argued above, vision is a complex phenomenon that can be analyzed at different levels of explanation and with respect to different tasks: color vision, spatial vision, motion visual detection, vision-for-action, etc. (Cattaneo and Vecchi 2011; Milner and Goodale 2006). In this respect: "What is sight restoration? Certainly, meaningless blobs of light should not be considered as such, but equally the ability to restore even relatively poor vision would be a triumph" (Fine et al. 2015). To this extent, we can visually represent, in different manners, several aspects and properties of the visual scene. What does it mean, then, to obtain a proper answer to M1 concerning the ability to visually discriminate? Simply having visual experience is not sufficient (also provided that visual experience of shapes is not what Molyneux's question is really about, as suggested by Matthen and Cohen in Chapter 20). Thus, while obtaining recovery of visual experience is not trivial from a biological point of view, Molyneux's question demands yet more significant restoration of vision—it demands an answer to M2 (Gallagher 2005; Schwenkler 2013; Ferretti 2017). As recent analyses offered by Schwenkler (2013) suggest, the famous empirical results from Held et al. (2011) on visual restoration are faulty in that visual discrimination of shape is not completely restored: subjects can "attend to low-level visual features like colour, shadow and approximate overall contours" without having "robust shape representations that could be compared across modalities" (Schwenkler 2013,

Molyneux's question. For instance, consider the role of memory in visual development, a condition anticipated by Epicurus (see Chapter 1). Without past visual experience, there is no possibility of storing visual information to build a visual memory. Without memory-stored information, there are no stored visual representations. Without stored visual representations, there is no association between what we see and what we have stored in our visual memory. That means that visual judgements and discriminations obtained in visual object recognition, which is always due to object reconstruction based on memory, cannot occur: there is no match between the new visual cues and the cues stored in memory during past experience, because there is no past record of experience at all. Another way to express the memory problem is that the ability to represent novel objects is usually slower than the ability to represent familiar objects (Bar 2004: 619). And so, the lack of past visual experience would result in the subject finding themselves in a novel visual world that they could not reconstruct through visual memory. Visual memory is, thus, a further important point to bear in mind when investigating Molyneux's question (Ferretti 2017).

In this respect, Toribio's Chapter 16 analyzes the notion of vision with respect to the concept of perceptual categorization and judgement and discusses a more specific role of memory—perceptual categorization:

> MQ [is] a version of the more general question of *how* certain properties, like being a sphere or being a cube, can feature in perception—a question about *perceptual* categorization. The claim defended here is that an answer to this *how*-question will provide a compelling answer to the *whether*-question illustrated by MQ: a negative answer.
>
> *Chapter 16*

Embracing the naturalistic stance discussed above, Toribio's argument starts from Ferretti's (2017) empirically informed idea that the newly sighted subjects would be in a similar perceptual situation as agnosic subjects—subjects who lack capacities in recognition. Molyneux's question, then, "comes hand in hand with the idea that, in recognizing something as a sphere or as a cube, we exercise a perceptual ability that involves a perceptual judgment with both a sensory and a cognitive phenomenology" (Chapter 16). Toribio argues that only perceptual judgments, grounded on the relation between perception and cognition, can lead us to understand MQ. If so, subjects fail to form appropriate perceptual judgements of visually presented shapes, leading Toribio to a "no" answer to Molyneux's question.

Chapter 17 by Ferretti investigates Molyneux's question in action from a new angle, i.e. by offering a new version of the notion of vision-for-action (Ferretti 2019b; see also Ferretti and Zipoli Caiani 2019), different from the one used in the attempts to analyze the relation between Molyneux's question and action processing (Gallagher Chapter 14; Ferretti 2017; see also Glenney 2013; Jacomuzzi et al. 2003), according to which, when we guide our motor behaviour visually, we see an object and superimpose, through *visuomotor imagery*, the representation of the proper motor act we can reliably perform on the object we see. Ferretti investigates whether Molyneux's subject would be able, with different constraints at hand, to perform such a superimposition of visuomotor images. Note that while past attempts have focused on the question concerning unconscious automatic action for Molyneux's subjects (Ferretti 2017), in his chapter in this volume Ferretti explores the conscious aspect of action performance. The answer depends on the theories we decide to take on what vision-for-action can be defined as and, thus, on how vision, action, and imagery are bounded after blindness—this move is in tune with Brogaard et al.'s move in Chapter 12 of analyzing the notion of vision when investigating the question experimentally, Nanay's move in Chapter 15 of analyzing the relation between

vision and imagery and Toribio's move in Chapter 16 of considering the link between vision and perceptual judgment and categorization when testing the status of potential Molyneux's subjects.

Conclusion

As we have argued, apart from a scientific miracle of immediate visual restoration of shape discrimination, a newly sighted subject requires restoration with practice, a restorative practice we must avoid to prevent perceptual learning, which again is something we need in order to restore visual discrimination. Worse still, visual discrimination of shape requires memory of stored information for its categorization of shape (Chapter 16), information that depends on perceptual learning. In sum, contemporary work must reckon with how much restoration of visual discrimination to allow.

In conclusion, advances in Molyneux's question must recognize when we cannot proceed a priori—we cannot avoid the empirical facts that suggest that the experimental situation we are looking for is not possible, even when we consider our investigation of MQ as a thought experiment (Chapter 13; Jacomuzzi et al. 2003). We agree with Block that "one needs to understand the empirical facts to even know where there is room for relatively a priori philosophy" (2014: 570–571). The case of Molyneux's philosophical question, which requires different theoretical and experimental approaches, demands empirical analysis. Yet, several conceptual and biological problems prevent us from finding an empirical solution, especially a failure to realize an acceptable experimental paradigm. One outcome of the experimental stalemate is that Molyneux's question will remain a unique kind of thought experiment whose conditions exclude it from our laboratories, but must include empirical results (Chapter 18).

Categorizing Molyneux's question as a unique kind of thought experiment leaves room for a priori reasoning about visual discrimination *at first sight*. We might imagine the different scenarios of sight opened by such a conundrum, even if a proper answer supported by a naturalistic approach is still unavailable. We might still try to figure out a possible answer in case the conditions of visual restoration become accessible.

The discussion of this general introduction was limited to the situation we can reach by paying attention to the neurobiology of vision, insofar as using a naïve pre-experimental notion of "vision" cannot explain the conundrum, as it would not completely and satisfyingly take into account the complex nature of human visual neurophysiology. Even so, the investigation of this question still remains very difficult, given the numerous constraints it requires and the problems it poses.

Notes

1 These famous treatises were not Locke's first foray into publishing, having published several of his own poems in honor of the important events in the lives of his friends and country (Bourne 1876, 1: 50–52). Marjiolean Degenaar has performed a similar honor to our volume by writing a poem in honor of Molyneux's question, found at the beginning of our volume.

2 "For these make perceivable impressions, both on the eyes and touch; and we can receive and convey into our minds the ideas of the extension, figure, motion, and rest of bodies, both by seeing and feeling (*Essay* II.v)." Strictly speaking, Locke does not claim here that the experience of seeing and touching would be in agreement, or that they will generate the same idea, but it would not be wrong to make these assumptions given that a shape is a simple idea acquired from both sight and touch. In fact, it would be odd to derive the claim that different simple ideas would be acquired by sight and touch of the same shape.

3 Molyneux likely took his question to be a test case for whether one's conceptual repertoire is acquired from specific sensory experiences and, if so, transfers to the new visual experiences of shape. By contrast,

Locke likely reasoned that the once-blind man would fail to recognize the shapes due to lacking the requisite visual "experience, improvement, and acquired notions" (II.ix.9) for perceiving the shape by sight (Bruno 2010). Per the pluralism reply we consider here, both philosophical inquiries are directly related to Molyneux's question and thus are equally possible replies.

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Appendix

Year	Answer	Person	Kind
1693	No	Molyneux	Heterogeneity
1693	Yes	Synge	Common sensibles
1694	No	Locke	Learning
1704	Yes	Leibniz	Common sensibles
1709	No	Berkeley	Heterogeneity
1727	No	Cheselden	Cataract experiments
1727	Yes	Hutcheson	Common sensibles
1733	No	Berkeley	Cataract experiments
1738	No	Voltaire	Cataract experiments
1738	No	Jurin	Degeneration
1746	Yes	Condillac	Common sensibles
1749	Yes	Diderot	Special stimuli
1749	No	Diderot	Degeneration
1749	Yes	Diderot	Special subjects
1749	Yes	Diderot	Common sensibles
1749	No	Buffon	Heterogeneity
1750	No	Mettrie	Degeneration
1754	No	Condillac	Heterogeneity
1764	No	Reid	Heterogeneity
1764	Yes	Reid	Common sensibles
1795	Yes	Smith	Nativism
1887	No	Lotze	Heterogeneity
1904	No	Abbott	Cataract experiments
1949	No	Hebb	Cataract experiments
1960	No	Von Senden	Heterogeneity
1972	Yes	Bach-y-Rita	Common sensibles
1974	Yes	Thompson	Common sensibles
1979	Yes	Evans	Special stimuli
1993	Yes	Meltzoff	Special subjects
1996	Yes	Campell	Common sensibles
1996	No	Degenaar	Degeneration
1996	No	Gallagher	Degeneration
1996	Yes	Gallagher	Common sensibles
2002	Yes	Prinz	Nativism
2003	Yes	Streri	Special subjects
2003	No	Gregory	Cataract experiments
2005	Yes	Gallagher	Special subjects
2005	Yes	Noë	Common sensibles
2006	No	Ostrovsky	Cataract experiments
2007	Yes	Levin	Common sensibles
2007	Yes	Van Cleve	Special stimuli
2009	No	Held	Cataract experiments
2011	No	Held	Cataract experiments
2013	No	Schwenkler	Special stimuli
2013	No	Cattaneo	Degeneration
2013	Plural	Glenney	Nativism
2016	No	Chen	Cataract experiments
2017	Plural	Ferretti	Learning
2019	Plural	Cohen/Matthen	Special stimuli
2020	Plural	Nanay	Learning

Figure 0.3 Timeline of 50 answers to Molyneux's question