

# Gombrich and 'Pictures that follow with their eyes'

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The A.W. Mellon Lectures in the Fine Arts which Ernst Gombrich gave in Washington in 1956 included his observations on the illusion that a portrait's gaze seems to follow the observer as the observer's viewpoint changes.<sup>1</sup> Four years later these lectures concerning 'the psychology of pictorial representation', together with various other of Gombrich's contributions to the subject, formed the basis for his seminal work *Art and Illusion*.<sup>2</sup> In this work he began to grapple with understanding this gaze-following illusion in the overall context of the perspectival changes in a picture seen from different viewpoints. Thus, under discussion here are objects which 'appear to point out of the picture toward the observer', contrasting with 'the properties of the three-dimensional space depicted within the picture' which have occupied many students of linear perspective ever since the Renaissance,<sup>3</sup> and Gombrich was to take on the challenge of explaining both the geometrical and the perceptual issues which lie behind the illusion.

Sometimes colloquially termed the Mona Lisa effect, 'Pictures that follow with their eyes'<sup>4</sup> had been a phenomenon known for millennia, and Gombrich cited both Pliny<sup>5</sup> and Lucian<sup>6</sup> as classical sources. But how is the illusion explained? In

<sup>1</sup> The terms 'eye(s)' and 'gaze' are used here and in much of the relevant literature somewhat interchangeably. In the present context, however, a distinction can and perhaps should be made, since while the former is the organ of sight, the latter comprises what the eyes project or subserve: 'the act of looking fixedly or intently; a steady or intent look' (*Oxford English Dictionary*, Sense 2).

<sup>2</sup> Ernst Gombrich, *Art and Illusion. A Study in the Psychology of Pictorial Representation*, New York: Pantheon Books and London: Phaidon Press, 1960.

<sup>3</sup> Bruce Goldstein, 'Rotation of Objects in Pictures Viewed at an Angle: Evidence for Different Properties of Two Types of Pictorial Space', *Journal of Experimental Psychology: Human Perception and Performance*, vol. 5, 1979, 78-87 (78).

<sup>4</sup> The expression 'Pictures that follow with their eyes' appears twice in the Notes in *Art and Illusion*, 414; 430.

<sup>5</sup> Gombrich references this in *Art and Illusion*, 414 as 'Pliny, *Historia naturalis* XXXV, 10 (37) (a Minerva by the painter Famulus or Amulius).' In the Loeb edition the passage reads: 'fuit et nuper gravis ac severus idemque floridis tumidus pictor Famulus. huius erat Minerva spectantem spectans, quacumque aspiceretur'. 'Another recent painter was Famulus, a dignified and severe but also very florid artist; to him belonged a Minerva who faced the spectator at whatever angle she was looked at'. Pliny, *Natural History*, Book XXXV.XXXVII, 120, Harris Rackham, transl. London: William Heinemann and Cambridge, Mass: Harvard University Press, 1952, vol. 9, 348-49.

<sup>6</sup> Gombrich's citation is to '... Lucian, *De Syria Dea*, quoted in Franciscus Junius, *The Painting of the Ancients*, p. 233.' Junius first refers to Pliny and the Minerva of Amulius, and then continues: 'There was in the Syrian goddesses her temple an image of *Juno*, which looketh upon you, if you stand full against it: if you goe from thence, it followeth you with her eyes: and if any other man looketh upon it from another place, he findeth the same: see *Lucian de*

*Art and Illusion* Gombrich posed the question, to which he responded but scarcely fully explained:

But do we not all feel that certain portraits look at us? We are familiar with the guide in a castle or country house who shows the awe-struck visitors that one of the pictures on the wall will follow them with its eyes. Whether they want to or not, they endow it with a life of its own. Propagandists and advertisers have exploited this reaction to reinforce our natural tendency to endow an image with a 'presence': Alfred Leete's famous recruiting poster of 1914 gave every passerby the feeling of being addressed by Lord Kitchener in person.<sup>7</sup>



Figure 1 Alfred Leete, 'London Opinion "Your country needs YOU"', 1914. Poster, 76.3 x 50.8 cm. US Library of Congress, reproduction number LC-USZ62-109369; image in the public domain.

Gombrich reproduced Leete's famous poster [fig. 1) and continued with further questions: 'Are these magic beliefs? Do we really think the image on the wall comes to life? The question may allow no more of a clear-cut answer than does any such question connected with symbolism'. Later in *Art and Illusion* Gombrich returned to the subject and to Leete's poster:

...we will assume that an eye looks at us, or a gun points at us, unless we have good evidence to the contrary. If the picture does not supply this contrary evidence and our projective tests fail to find it, we will succumb to the illusion. There are geometrical reasons why the eye, or the muzzle of the gun, will fail to respond to our movement test. A real gun when seen at an

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*Syriâ dêâ.*' Franciscus Junius, *The Painting of the Ancients in three Bookes...* ('Written first in Latine...and now by Him Englished...'), London: R. Hodgkinsonne (printer), 1638, 233.

<sup>7</sup> Gombrich, *Art and Illusion*, 113.

increasing angle would show less and less of the muzzle. The painted round of the muzzle threateningly fails to do so—the imagination supplies the rest. The same is true of the eyes...<sup>8</sup>

How 'the imagination' allows the eyes, or perhaps more strictly the eyes' gaze,<sup>1</sup> to 'supply the rest' and follow the observer is not clarified further, although in the Notes referring to 'ancient and modern explanations of the illusion',<sup>9</sup> Gombrich stated 'The correct explanation of the illusion is already given by Ptolemy in his *Optics*, Bk II, 133',<sup>10</sup> whom he then quoted:

It is also assumed that the image of a face painted on panels follows the gaze of [moving] viewers to some extent even though there is no motion in the image itself, and the reason is that the true direction of the painted face's gaze is perceived by means only of the stationary disposition of the visual cone that strikes the painted face. The visual faculty does not recognize this, but the gaze remains fixed solely along the visual axis, because the parts themselves of the face are seen by means of corresponding visual rays. Thus, as the observer moves away, he supposes that the image's gaze follows his.<sup>11</sup>

For more 'recent' explanations, Gombrich referred to the paper 'The Apparent Direction of Eyes in Painting', published in 1824<sup>12</sup> in the *Philosophical Transactions of the Royal Society of London* by William Hyde Wollaston, chemist, physicist and physician, and sometime President of the Royal Society.<sup>13</sup> Wollaston deals with the gaze-following phenomenon only in the last two pages of the paper, and again a precise explanation seems wanting. The phenomenon is however illustrated in that paper by a drawing made by Sir Thomas Lawrence, President of the Royal Academy, which demonstrates that as the portrait's eyes rotate towards the moving observer, so too and to the same extent does the compass point illustrated beneath [fig. 2].

To today's student, neither Ptolemy nor Wollaston fully explains the mechanism of the illusion, and, in passing, neither writer comments that the illusion

<sup>8</sup> Gombrich, *Art and Illusion*, 276-7.

<sup>9</sup> Gombrich, *Art and Illusion*, 414.

<sup>10</sup> Gombrich, *Art and Illusion*, 430.

<sup>11</sup> 'Putatur etiam quod ymago faciei depicte in tabulis respiciat parum in aspicientes illam sine motu ipsius ymaginis, quoniam vera respectio non dinoscitur nisi per stabilitatem forme eiusdem visibilis radii qui cadit super depictam faciem. Visibilis ergo sensus non novit hoc, sed respectio fit ad locum radii qui est propinquus axi tantum, quoniam ipse partes faciei aspiciuntur per radios visus qui sunt ordine consimiles. Cum ergo aspiciens elongabitur, putat quod ymago respiciat cum eo respiciente.' Translation in A. Mark Smith, 'Ptolemy's Theory of Visual Perception: an English Translation of the *Optics* with Introduction and Commentary', *Transactions of the American Philosophical Society*, vol. 86, Part II, 1996, 124.

<sup>12</sup> Gombrich, *Art and Illusion*, 430. Gombrich incorrectly dated the paper as 1924.

<sup>13</sup> William Wollaston, 'On the Apparent Direction of Eyes in a Portrait', *Philosophical Transactions of the Royal Society of London*, vol. 114, 1824, 247-256.

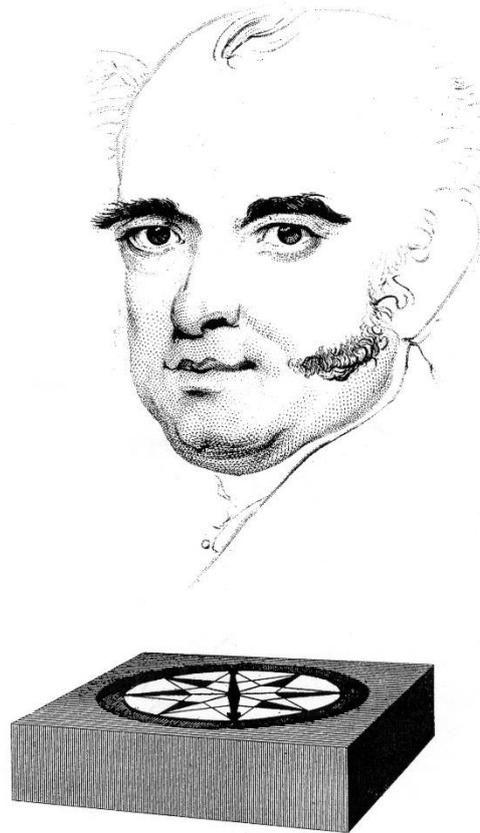


Figure 2 Plate XII following p. 256 from William Wollaston, 'On the Apparent Direction of Eyes in a Portrait', *Philosophical Transactions of the Royal Society of London*, vol. 114, 1824, 247-256. © The Royal Society.

does not occur with a sculpture. Furthermore, neither writer comments that the portrait's gaze must be directed towards the viewer, although Gombrich believed 'all portraits do this ['follow us with their eyes'] when they do not clearly *look elsewhere...*'.<sup>14</sup> Thus, at that time, Gombrich's appeal to authorities such as these appears insufficient, and he was to return to the subject, republishing his 1961 article in the *Saturday Evening Post* entitled 'Illusion and Visual Deadlock' in *Meditations on a Hobby Horse and Other Essays on the Theory of Art* in 1963. In this essay concerning the more general phenomenon of 'the illusion that objects pointing toward us from paintings will follow us as we shift our position', Gombrich continued:

The most bored and footsore tourist will spring to attention when the guide demonstrates the ancestral portrait that follows him with its eyes or the pointed gun that always aims at him wherever he stands in the hall. It is easy to dismiss this surprise as naïve, but less easy to exhaust the implications of this little mystery. One thing is sure: The mystery does not

<sup>14</sup> Gombrich, *Art and Illusion*, 276.

rest in any particular skill on the part of the painter. The effect is quite frequent and indeed inevitable ... [and] the principle condition for the effect is a sense of depth combined with an unforeshortened portion of an object that appears to lie quite close to the frontal plane.<sup>15</sup>

Here Gombrich went further and outlined more specific explanations for a portrait's gaze-following, which comprised elements relating to that sense of depth and foreshortening.

To briefly digress, one concern with this approach is that, while Gombrich recognised the difficulties in visualising 'The spatial relationship between eyes and the surface of the face',<sup>16</sup> the visible portion of the eye has a depth of less than 4 mm,<sup>17</sup> and can therefore scarcely give rise to any significant 'sense of depth'. The eyes' gaze—a perceptual or psychological rather than a substantial, structural construct—could however provide such an entity, which is perhaps something Gombrich envisaged or assumed.

Another concern which has recently emerged relates to Gombrich's claim that the phenomenon is 'inevitable.' An extremely brief and anecdotal study found that not everyone experiences the gaze-following illusion, at least in respect of the *Mona Lisa*. Thus Abraham Tamir found that only 65% of 500 individuals asked to look at the picture considered she was looking at them from all directions; 93% of individuals felt that *Mona Lisa* was looking at them when viewing her from the right, 72% from the front, and 78% from the left. Tamir concluded that these results 'were surprising and negate the well-known myth that *Mona Lisa* looks at the observer from all directions viewed...'.<sup>18</sup> What Tamir did not consider, however, is the influence of subliminal rather than conscious reactions to images, but it would be difficult to confirm Gombrich's claim that the gaze-following phenomenon is indeed 'inevitable'.

Acknowledging he had never been satisfied that the explanation he had given in *Art and Illusion* and *Meditations* had been 'exhaustive',<sup>19</sup> in 1972 Gombrich revisited the subject of how images appear when viewed from elsewhere other than directly forward facing. In 'The "What" and the "How": Perspective Representation and the Phenomenal World' Gombrich discussed in considerable depth the way 'the perspective picture is stretched or transformed'.<sup>20</sup> He acknowledged that his explanation in *Art and Illusion* as to how perspective changes when one moves past

<sup>15</sup> Ernst Gombrich, *Meditations on a Hobby Horse and Other Essays on the Theory of Art*, London: Phaidon Press, 1963, 158.

<sup>16</sup> Ernst Gombrich, 'Illusion and Art', in: Richard Gregory and Ernst Gombrich, eds. *Illusion in Nature and Art*, London: Duckworth, 1973, 202.

<sup>17</sup> Elaine Marieb, *Human Anatomy and Physiology*, 4th ed, Menlo Park, California: Scott Foresman Addison Wesley, 1998, 542.

<sup>18</sup> Abraham Tamir, 'How to look at pictures according to "Mona Lisa Gaze Principle"', *The Journal of Craniofacial Surgery*, vol. 25, 2014, e229-230.

<sup>19</sup> Ernst Gombrich, 'The "What" and the "How": Perspective Representation and the Phenomenal World', in: Richard Rudner and Israel Scheffler, eds, *Logic & Art: Essays in Honor of Nelson Goodman*, Indianapolis and New York: The Bobbs-Merrill Company, 1972, 142.

<sup>20</sup> Gombrich, *Logic & Art*, 149.

a picture was wrong; it was not that "we contribute some of the imagined movement from the store of our own explanation" ... It is of course the result of the foreshortening of the picture as we look at it from the side',<sup>21</sup> and in a footnote Gombrich conceded that 'the most balanced and authoritative treatment of this subject'<sup>22</sup> had been that of the Dutch historian and ophthalmologist Gezienus ten Doesschate. ten Doesschate had commented that 'in a picture the images of the objects do not show relative displacements to a moving spectator. This absence of shifting is the cause of apparent movements in the pictures themselves. We may get the impression that the eyes of a depicted person are following us', and ten Doesschate goes on to observe that the sizes of the 'triangles of white' to the sides of a person's irises change as that person's direction of gaze changes.<sup>23</sup> Gombrich, however, emphasised instead the contribution of foreshortening, again including the eye, in the overall discussion:

In a painting, an object with a pronounced aspect such as a foreshortened gunbarrel, a pointing finger, or a human eye will continue to show the same aspect from whatever side we look at the picture. If these objects were not painted, but real, any move on our part would of course show them from a different side and reveal a different aspect; since we fail to produce this change, we instinctively assume that the object is still pointing at us and must therefore have moved. The effect is stronger where the object concerned is seen thrusting outward from the picture, because such an object would change its aspect more rapidly than would another, further in the distance...[but] I know now that this explanation is incomplete...<sup>24</sup>

Here again the issue concerning the lack of depth and thus any element of foreshortening of an eye arises. However, open to further debate is the nature of what 'we instinctively assume'. Instinctive assumptions hardly represent an explanation, any more than does a natural tendency 'to endow an image with a 'presence''. Furthermore, they contrast with the view put forward by the psychologist Hans Wallach, who considered the illusion was 'probably learned'. That view, included in Wallach's discussion of the subject,<sup>25</sup> was surely familiar to

<sup>21</sup> Gombrich, *Logic & Art*, 144, but this quotation repeated from *Art and Illusion* (p. 276) is slightly incorrect; and 'explanation' should read 'expectations'.

<sup>22</sup> Gombrich, *Logic & Art*, 132.

<sup>23</sup> Gezienus ten Doesschate, *Perspective: Fundamentals, Controversials, History*, Nieuwkoop: De Graaf, 1964, 18. However, the importance of the sclera seems doubtful, not least since even drawings depicting diagrammatic outlines of eyes can appear to follow the observer.

<sup>24</sup> Gombrich, *Logic & Art*, 142-143.

<sup>25</sup> Hans Wallach, 'The Apparent Rotation of Pictorial Scenes', in: Mary Henle, ed. *Vision and Artifact*, New York: Springer Publishing Co., 1976, 67-68. Wallach's explanation of the illusion is particularly clear and elegant: 'The painted head does not rotate at all in relation to the passing observer; being flat on the canvas, it cannot be seen from different directions. The moving observer sees the portrait always from the same direction. For a real head not to rotate optically in relation to the moving eye, it would have to turn objectively so that it is always seen from the same direction. In other words, it would have to rotate by 100 percent

Gombrich, since Gombrich had presented a paper on the occasion of Wallach's retirement just four years later in 1976,<sup>26</sup> and in his contribution to *Illusion in Nature and Art* Gombrich had already discussed the 'inborn' versus 'learned' response to eyes — favouring the former.<sup>27</sup> That contribution was possibly the last occasion Gombrich pondered the way that what the observer sees in images changes as the observer's viewpoint changes:

More evidence for the illusion of depth comes from the shift in apparent orientation following a change of viewing point. The 'constancies' mask the perspectival distortions of the picture plane and make us read them as movement in space.<sup>28</sup>

His illustration of the illusion comprised three sketches of Meindert Hobbema's painting in the National Gallery *The Avenue of Middelharnis*, as viewed from the left, directly forward, and the right [Fig. 3], with the legend 'Seen from any angle the road in the picture appears to lead towards us. The illusion is due to the transformations of the picture plane.'<sup>29</sup>

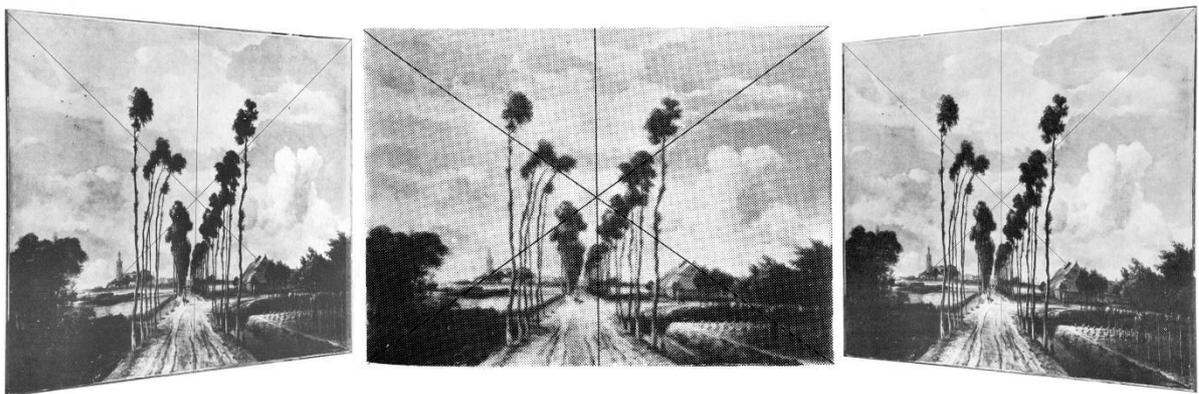


Figure 3 Adapted from Gombrich's versions of Meindert Hobbema's painting *The Avenue of Middelharnis* as viewed from the left, directly forward, and the right. From: Ernst Gombrich, 'Illusion and Art' in: Richard Gregory and Ernst Gombrich, eds. *Illusion in Nature and Art*, London: Duckworth, 1973, 230-231. With permission of Gerald Duckworth & Co Ltd and the Literary Executor of E.H. Gombrich.

While Gombrich did not include here any reference specifically to gaze, and chose to illustrate his observations with a landscape — rather than a portrait — as seen from different viewpoints, of note is that his emphasis concerning underlying mechanisms had shifted from those references to 'presence' and 'imagination' in *Art and Illusion* to an emphasis on geometry. Remarkably, however, in respect of

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of the observer's position change, and this is, in close approximation, what the painted head does optically when the observer walks by.'

<sup>26</sup> Ernst Gombrich, 'Standards of Truth: The Arrested Image and the Moving Eye', in: *The Image and the Eye: Further Studies in the Psychology of Pictorial Representation*, Oxford: Phaidon Press, 1982, 244-277.

<sup>27</sup> Gombrich, *Illusion in Nature and Art*, 203.

<sup>28</sup> Gombrich, *Illusion in Nature and Art*, 230-231.

<sup>29</sup> Gombrich, *Illusion in Nature and Art*, 231.

portraits, this shift is currently beginning to shift back again, with attention increasingly being paid to the 'spooky' and similarly termed imaginative effects which the pursuing gaze can engender and which are discussed below. Surely, returning to 1960 and *Art and Illusion*, such effects are what made viewers of portraits 'awe-struck' when they became aware that 'one of the pictures on the wall will follow them with its eyes...[which] endow it with a life of its own.'<sup>7</sup>? Gombrich's various studies thus lead one to postulate that when one moves around a picture, two distinct albeit related phenomena emerge, both of which Gombrich discussed but appears not to have clearly separated.

First is the phenomenon attributable to changes in the slant and other geometrical features of a picture and its setting within its frame and on the wall—Gombrich's 'perspectival distortions'<sup>28</sup>—which underpins the changes in all pictures when viewed anywhere other than when directly facing forward. These changes are amenable to analysis and measurement, and there are numerous studies dealing with this subject.<sup>30</sup> To select a few examples specific to gaze, gaze remains directed towards the observer 'even when the portrait is slanted and the background is perceived slanted',<sup>31</sup> an observation which concurred with an earlier finding which came to a similar conclusion but which also found that gaze when not directed towards 'the station point' appears to rotate at increasingly extreme locations as the picture is increasingly slanted away from the observer.<sup>32</sup> Surprisingly, whether the observer moves to the side or the picture is slanted, gaze experienced as looking at the observer only fails when the slant exceeds 70°.<sup>33</sup> But when is gaze actually directed towards the observer? The concept of the simple, single ray has tended to be superseded now by the 'gaze cone'—the gaze directions within which a person experiences being looked at—and ranges from between 4° and 9° from its centre,<sup>34</sup> and the brain's response is broadly similar, whether the gaze cone is presented centrally or even shifted to the side by at least 28°, providing the portrait continues to make eye contact.<sup>35</sup>

<sup>30</sup> For review and references, see for example, Jan Koenderink, Andrea van Doorn, Astrid Kappers, and James Todd, 'Pointing out of the Picture', *Perception*, vol. 33, 2004, 513-530.

<sup>31</sup> Takao Sato and Kenchi Hosokawa, 'Mona Lisa Effect of Eyes and Face', *i-Perception*, vol. 3, 2012, 707.

<sup>32</sup> Sheena Rogers, Melanie Lunsford, Lars Strother, and Michael Kubovy, 'The Mona Lisa Effect: Perception of Gaze Direction in Real and Pictured Faces', In: Sheena Rogers and Judith Effken, eds. *Studies in Perception and Action VII*, Mahwah, New Jersey and London: Lawrence Erlbaum Associates, 2003, 19-24. This observation chimes with Goldstein's evidence that some objects appear to rotate more than others, this differential rotation being closely related to the depicted angle of objects in the picture (see Footnote 3 above. In his paper (p. 86), Goldstein found Gombrich's explanation in *Logic & Art*, p. 142, wanting).

<sup>33</sup> Heiko Hecht, Evgenia Boyarskaya, and Akiyoshi Kitaoka, 'The Mona Lisa Effect: Testing the Limits of Perceptual Robustness Vis-à-Vis Slanted Images', *Psihologija* vol. 47, 2014, 287-301.

<sup>34</sup> Matthias Gamer and Heiko Hecht, 'Are You Looking at Me? Measuring the Cone of Gaze', *Journal of Experimental Psychology*, vol. 33, 2007, 713.

<sup>35</sup> Evgenia Boyarskaya, Alexandra Sebastian, Thomas Bauermann, Heiko Hecht, and Oliver Tüscher, 'The Mona Lisa Effect: Neural Correlates of Centered and Off-Centered Gaze', *Human Brain Mapping*, vol. 36, 2015, 619- 632. This finding from a functional magnetic

Second is the more enigmatic phenomenon which applies to 'Pictures which follow with their eyes.' Specific to portraits' eyes and their gaze are visual effects which have sometimes been described as 'uncanny' and 'spooky'<sup>36</sup> and which are presumably akin to Gombrich's concept of 'presence'. These effects are interactive and can be powerful; as Gombrich noted at the beginning of *The Story of Art*, the depiction of eyes of 'a creature' means 'at last it can look at us!'<sup>37</sup> The portrait then indeed has 'a life of its own'<sup>7</sup> and becomes 'miraculously animated'.<sup>36</sup> John Shearman discussed this seeming two-way interaction between the portrait and the spectator, taking the *Mona Lisa* as an example, and observed that 'what generates that impression of life is specifically the transitive relationship between sitter and spectator...'<sup>38</sup> But this phenomenon is subjective, unpredictable, and—since, according to Gombrich, being subserved by 'the imagination'<sup>8</sup>—is scarcely susceptible to experimental analysis. Nevertheless, it is this interactive element which perhaps underlies the power and at times disturbing effect exerted by a portrait which gazes at and follows us. Recalling Gombrich's reference to Pliny and 'a Minerva by the painter Famulus or Amulius' who 'faced the spectator at whatever angle she was looked at'<sup>5</sup>—possibly the earliest reference to the gaze-following phenomenon, this power would surely have imbued the goddess with impressive attributes.<sup>39</sup> But conversely, as Gombrich also pointed out, the power of eyes which follow could have unfortunate effects too, witness that 'In Byzantium and Ethiopia, evil figures such as Judas are never shown looking out of the picture for fear their evil eye may harm the onlooker'.<sup>40</sup>

No wonder, therefore, Gombrich refers to 'the magic of eyes',<sup>41</sup> and his reference to 'our natural tendency to endow an image with a 'presence''<sup>7</sup> surely applies in particular, if not specifically, to the eyes, and touches on an earlier comment in *Art and Illusion* that 'we respond with particular readiness to certain

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resonance imaging study provides objective evidence that the brain's response is indeed the same in all directions of gaze when gaze follows the moving observer, as the *Mona Lisa* phenomenon would predict.

<sup>36</sup> Jan Koenderink, Andrea van Doorn, Baingio Pinna, and Robert Pepperell. 'Facing the Spectator', *i-Perception*, vol. 7, November-December 2016, 1-29 (2) doi: [10.1177/2041669516675181](https://doi.org/10.1177/2041669516675181).

<sup>37</sup> Ernst Gombrich, *The Story of Art*, London: Phaidon Press, 1950, 25. His use of the term 'creature' here is apt, because forward-facing eyes of animals too follow the moving observer.

<sup>38</sup> John Shearman, *Only Connect...: Art and the Spectator in the Italian Renaissance*, Princeton: Princeton University Press, 1992, 124.

<sup>39</sup> Half a millennium later, such impressive attributes would have received confirmation from Nicholas of Cusa, for whom the "'icon of God'" was indeed 'omnivoyant', and, pertinent here, Nicholas too confirmed that 'Regardless of the place from which each of you looks at it, each will have the impression that he alone is being looked at by it...[and] will marvel at the changing of the unchangeable gaze...', moreover '...that face does not desert anyone who is moving...'. In: Jasper Hopkins, *Nicholas of Cusa's Dialectical Mysticism: Text, Translation, and Interpretative Study of De Visione Dei*, 2nd ed, Minneapolis: Arthur J. Banning Press, 1988, 115; 117.

<sup>40</sup> Gombrich, *Art and Illusion*, 113.

<sup>41</sup> Gombrich, *Illusion in Nature and Art*, 202.

configurations of biological significance for our survival.<sup>42</sup> The scientific basis for this response was anticipated in Gombrich's reference to Lorenz and Tinbergen's classical ethnographic studies and the accompanying Note, tellingly headed 'Response to Faces.'<sup>43</sup> Since then an enormous body of scientific research has demonstrated that there are regions in the brain of both monkeys and humans which respond selectively to faces, bodies and eye gaze, and that gaze-following may well be 'hard-wired' within particular circuitry within the brain.<sup>44</sup>

Gombrich may not have explicitly stated that there appear to be two distinguishable phenomena: one – applicable to all pictures before which the observer moves – that is underpinned by objective geometry, and the other – the special case, relevant to gaze-following – that is often characterised by subjective perceptions. Nevertheless, he undoubtedly explored both aspects, and would have acknowledged that both phenomena could co-exist and that there might be other as yet unknown explanations. He also recognised the interplay between art and science, exemplified in *Art and Illusion* a few pages before his consideration of Alfred Leete and his poster by a discussion of the Rorschach inkblots,<sup>45</sup> in which, just as with 'pictures which follow with their eyes', psychological as well as visual phenomena are in play.<sup>46</sup>

For Gombrich the gaze-following illusion was a subject which continued to intrigue him for 40 years from the time of the first edition of *Art and Illusion* to the last in 2000. He was magisterial in his observations and discussions, and, as throughout *Art and Illusion*, he embraced a multifaceted approach which could encompass both an historical look backwards and new ways of thinking – witness his emphasis on the geometrical basis for the gaze-following problem in his later writings. Although a definitive explanation for the illusion and for its sometimes unexpected and occasionally unsettling effects arguably remained elusive for him, he is in good company – for even now 'hardly anything is known about the neural basis of the Mona Lisa effect'.<sup>47</sup> All perception is a sensory experience subserved by the brain, and Gombrich with his interest in 'the psychology of pictorial representation', like many other art historians, would surely have approved of the increasing interest that experimental psychologists and neuroscientists are taking in this remarkable visual illusion.

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<sup>42</sup> Gombrich, *Art and Illusion*, 103.

<sup>43</sup> Gombrich, *Art and Illusion*, 101-102; 413.

<sup>44</sup> For review and references, see Nathan Emery, 'The eyes have it: the neuroethology, function and evolution of social gaze', *Neuroscience and Biobehavioral Reviews*, vol.24, 2000, 581-604.

<sup>45</sup> Gombrich, *Art and Illusion*, 105.

<sup>46</sup> Geoffrey Schott, 'Revisiting the Rorschach ink-blot: from iconography to neuroscience', *Journal of Neurology, Neurosurgery and Psychiatry*, vol. 85, 2014, 699-706.

<sup>47</sup> Evgenia Boyarskaya, Alexandra Sebastian, Thomas Bauermann, Heiko Hecht, and Oliver Tüscher, *Human Brain Mapping*, 620.

relationship between images and how brain function is depicted, and publications include papers on Leonardo da Vinci's handwriting; Piero della Francesca's three dimensional representations and modern brain imaging presentation; the use of arrows when picturing brain function; and the art and science of the Rorschach ink-blots.

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