An un-visceral reality: Escher and the virtual

Adam Nash

Virtual reality

Escher knew that drawing is a kind of optical illusion. To say he was depicting optical illusions misses the point of his practice. As Bruno Ernst puts it, 'depicting is deceit'.[1] Our eyes are so easily fooled. More precisely, our brains are so easily fooled by what our eyes see. Escher's primary and abiding concern was to deal with the two-dimensional plane as a medium unto itself, a medium deceitful by nature. He shares this preoccupation with today's technicians of computer graphics and virtual reality (VR). Unlike them, though, Escher was not always trapped in an unexamined obedience to a representative reality that overruled experimental excursions into the formal possibilities of a fictional plane. Escher himself said:

> Our three-dimensional space is the only true reality that we know. The two-dimensional is every bit as fictitious as the four-dimensional, for nothing is flat, not even the most finely polished mirror. And yet we stick to the convention that a wall or a piece of paper is flat, and curiously enough, we still go on, as we have done since time immemorial, producing illusions of space on just such plane surfaces as those. Surely it is a bit absurd to draw a few lines and then claim: 'This is a house'.[2]

For Escher, the whole point was to play with the knowledge, shared by viewer and artist alike, of the absurdity of representation on a two-dimensional plane. Together, viewer and artist enjoy 'a quick and continual jumping from one side to the other',[3] back and forth between the immersive impossible world and the sobering reality of the plane. Escher said of his works *Plane filling I*, 1951 (opposite), and *Plane filling II*, 1957 (p. 247): 'The only reason for their existence is one's enjoyment of this difficult game'.[4]

Much like computer games, these 'difficult games' are played in a sort of cooperative virtual space maintained between player (viewer), game designer (Escher) and the medium (digital or paper). The formal play between deception and depiction makes up a large part of the viewer's enjoyment of Escher's work, just as Escher is clearly enjoying this play, setting up the rules of the virtual world with an internal value system that takes into account its own playful worthlessness. All video games do this, even if often subconsciously or in direct denial of the deceit of depiction in a race to 'realism'.

This visual play, or self-conscious trick, is what underlies all contemporary computer graphics including VR, augmented reality (AR), computer games and flashy Hollywood special effects. A two-dimensional plane, playing imaginary constructs across its surface, that play across the surface of our retinas, that our brains really render. Crucial to the success of this trick is our habit of focus; our inability to focus on more than one thing. As Escher said: 'Our eyes are accustomed to fixing upon a specific object. The moment this happens everything round about becomes reduced to background'.[5] This is the device through which he explores infinity.

Infinity

The ability to intimate infinity on such a finite form as a piece of paper, a two-dimensional plane so clearly and finitely bounded, was what so endeared Escher to some mathematicians of the latter half of the twentieth century. Those mathematicians were sometimes inspired by Escher's works to pursue certain investigations, and some of his works even 'anticipated later discoveries by mathematicians'.[6] Escher's exploration of infinity took two forms: that of 'limit', as in the *Circle Limit* series, 1958–60 (see pages 210, 243, 255), and *Square limit*, 1964 (p. 259); and that of 'regular division of the plane', of which he produced over 100 drawings and other works, starting around 1937 and continuing throughout his life. The 'regular division' works anticipate in

Plane filling I March 1951 mezzotint (detail)

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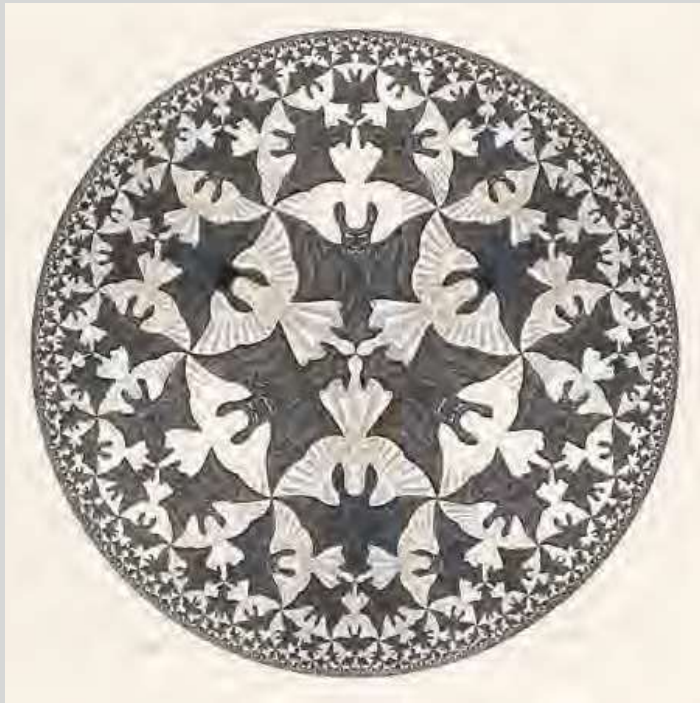
Circle limit IV (Heaven and hell) July 1960 woodcut
(overleaf) *Predestination* January 1951 lithograph

many ways the procedural generation techniques used to create so many of today's game worlds and virtual environments. The tiling and tessellating are what is needed for computers to draw endlessly expanding planes for players to wander on, although they generally lack Escher's exploratory edges and playfully deceptive representational tiles.

But it's not only literally, technically, that Escher's desire to explore the infinite presages the ways of our digital world. It is the invitation extended by the enactment of endless mathematical possibilities within the personal plane in front of our eyes. Virtual reality, augmented reality, mixed reality (MR) ... these phrases are all appropriate descriptors of Escher's work. It's instructive that Escher Reality is the name of the AR tech company now providing the core of *Pokémon GO*, a wildly popular AR game that allows you to play in a world that is ostensibly more magical than this world (though it is this world).[7] Like Escher, it does this by manipulating the deceit of depiction on a plane. That this magical world ends up reinforcing the banal and brutal values of this world by making you capture, compete, dominate and fight is perhaps analogous to Escher's inability to really escape into infinity, skating on its surface while reinforcing the sexist, racist, classist norms of the time.

Escher was a northern European man whose family supported him financially until he was fifty-three, when he finally started to make money from his work. Refusing to engage artistically with contemporary issues, he said his works were 'abstractions that have nothing to do with reality'.[8] In this insistence, we can see the privilege that allowed him to stay removed. At the same time, any cultural product that is not produced with an explicit cultural, political or spiritual agenda is hollow at its core, presenting a vacuum that will immediately be filled by the dominant politico-cultural value of its time and place. As Escher lamented of the futility of his quest to enter the quiet dream of infinity, 'no-one can draw a line that is not a boundary line'.[9] Evidently his work was his way of staying apart from the world.

Aloofness

Escher's aloofness, his unemotional engagement as acknowledged by his son George,[10] is analogous to the clinical dispassion of the digital capitalists, with their machine learning, artificial intelligence, big data, computer vision and surveillance. His multiple-view works, like *Other world*, 1947 (p. 215), and *Up and down*, 1947 (p. 283), intimate a digital future where data is able to look from multiple viewpoints at once. This is a deceit as well, of course, since it is merely a mathematical fancy, overruled by time, but we continue to increase our reliance on the digital grid of viewpoints, like a security guard in a control centre attempting to watch all entrances, exits, halls and doors at once.

This aloofness, this mathematical research, is also what produces the least satisfying experiences of Escher's work – his caricature-like representations of lizards, fish and so on. On the one hand, we see an almost offhand reference to the paradox of representation by a skilled artisan, on the other we see a refusal to engage more deeply with all the other invitations of representative deception or deceptive representation.

We see this most promisingly in the plants depicted in the early pictures. Escher displays a tantalising engagement with the ostentatiously erotic wastefulness of nature that results in a set of plant representations that pre-empt – visually, not mathematically – the digital plants of the L-systems that generate the flora of so many digital environments today. Good examples are *Wood near Menton*, 1921 (pp. 216–17), and *Pentedattilo, Calabria*, 1930 (p. 163). His woodcut *Tree*, 1919,[11] not included in this exhibition, perhaps represents his most explicit engagement with the invitation of plant biology for more imaginative representation, from which he retreats for the rest of his career, much as virtual environment designers do to this day. This superficial engagement persists almost unchanged into the later pictures until *Waterfall* in 1961 (p. 19), where the

plants are suddenly laid out seemingly in tribute to the outrageously precise natural meanderings presented by Haeckel, the nineteenth-century zoologist and artist much concerned with mathematical symmetry in the natural world.[12]

This refusal to pursue more fanciful, less guided paths has perhaps prevented Escher from gaining respect from the arbiters of fine art, even as it seems he was equally as undesiring of this approbation as he was awarded it, referring to himself always as a 'graphic artist', and being repaid in kind, in just one of many examples, by *New York Times* art critic Roberta Smith, who quite explicitly calls him a 'non-artist'.[13] And it seems he really was the kind of graphic artist whose early portrait of his father, the dispassionate and not-crazy-at-all engineer, was just as much an aspirational self-portrait.

Escher's status as 'non-artist' is analogous to the non-art status of video games and virtual reality. Without getting into the details of a debate that burned brightly several years ago and which continues to smoulder, it is fair to say that regardless of video games' aspirations or self-identity, the world of fine art remains, with a few notable institutional exceptions, unengaged with them in a broad sense, and for many of the same reasons it has for so long refused to anoint Escher. Virtual reality, such as it might be defined currently, is similarly viewed, but with the difference that it might serve as a design device to help people appreciate real art.[14]

Perhaps in this we see the very emblem of the kind of exhibition for which this essay is written: design as non-art, exerting the same kind of irresistible visual attraction, the instantly graspable paradox of seductive surface, that Escher so effortlessly executed.
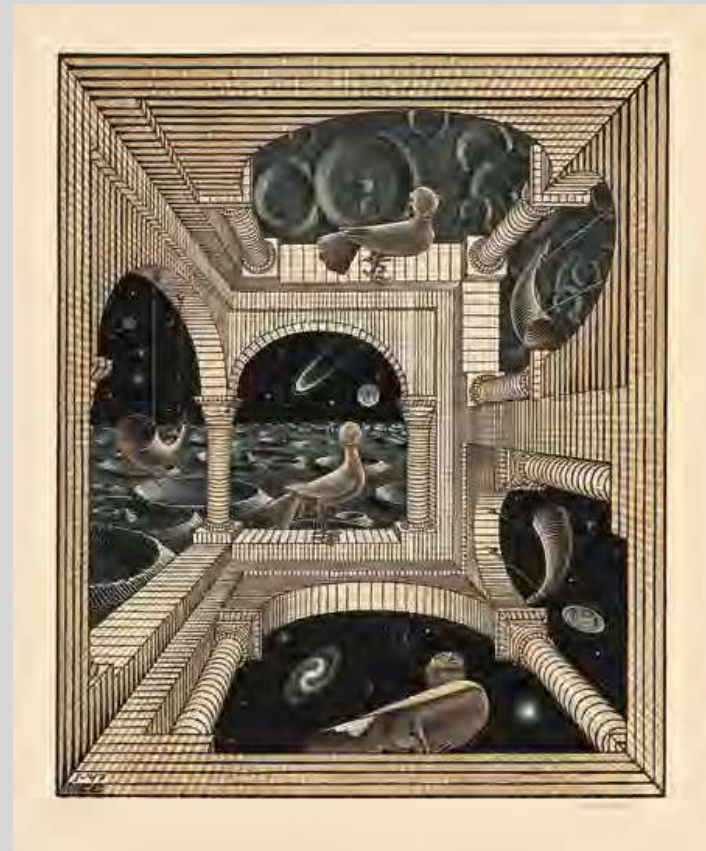
Other world January 1947 colour wood engraving and woodcut
(overleaf) *Wood near Menton* 1921 woodcut

Notes

Between two worlds: M. C. Escher by Cathy Leahy, p. 1

1   M. C. Escher quoted in Doris Schatt-schneider, *Visions of Symmetry*, Harry N. Abrams, New York, 2004, p. 2.
2   J. R. Kist, 'Italy and Spain 1922–1924', in J. L. Locher (ed.), *M. C. Escher: His Life and Complete Graphic Work*, trans. Tony Langham & Plym Peters, Harry N. Abrams, New York, 1992, p. 21. The drawing related to this print is dated 25 April 1922, and is reproduced in David Steel et al., *The Worlds of M. C. Escher: Nature, Science, and Imagination*, North Carolina Museum of Art, Raleigh, 2015, p. 59.
3   See photograph of the scene taken by Mark Veldhuysen reproduced in Steel, p. 87.
4   J. W. Vermeulen, 'I'm walking around all by myself here', in M. C. Escher & Janet Wilson (ed.), *Escher on Escher: Exploring the Infinite*, trans. Karin Ford, Harry N. Abrams, New York, 1989, pp. 143–4.
5   M. C. Escher, *The Graphic Work of M. C. Escher*, revised and expanded edn, trans. John E. Brigham, Oldbourne, London, 1967, p. 9.
6   Escher was particularly fascinated by spherical reflections because, although distorted and compressed, they provided a more complete view than did direct observation. ibid. p. 18.
7   ibid. p. 9.
8   ibid. p. 10.
9   Doris J. Schattschneider, 'Mathematics and the art of M. C. Escher', lecture, National Gallery of Art, Washington, 25 April 2018, available at <https://www.nga.gov/audio-video/audio/escher-schattschneider.html>, accessed 5 June 2018.
10 At his acceptance speech when he was awarded the Culture Prize of the City of Hilversum on 5 March 1965, Escher spoke on the nature of his prints. Quoted in Locher, p. 124.
11 G. Pólya, 'Über die Analogie der Kristall-symmetrie in der Ebene', *Zeitschrift für Kristallographie*, vol. 60, 1924, pp. 278–82.
12 The De Roos Foundation in Utrecht commissioned Escher to write a book about his interest in the regular division of the plane. It was published as a limited collector's edition of 175 copies in 1958: *Regelmatige vlakverdeling*, Stichting De Roos, Utrecht, 1958. It also appeared in other later Dutch publications and in translation in several English publications. Escher & Wilson (ed.), pp. 90–127.
13 Escher, *The Graphic Work of M. C. Escher*, p. 11.
14 *Atrani, Coast of Amalfi*, August 1931, lithograph no. 148, in F. H. Bool et al., 'Catalogue', in Locher.

15 Escher was not satisfied with *Metamorphosis I* because he felt the elements of the boy and the town did not have a logical relationship. Escher printed more impressions of *Day and night* than any other print in his oeuvre, totalling over 650 impressions.
16 Flip Bool (ed.), *M. C. Escher (1898–1972): Regular Divisions of the Plane at the Haags Gemeentemuseum*, trans. Ruth Koenig, Haags Gemeentemuseum, The Hague, 1986, p. 6.
17 Escher decorated the Leiden Town Hall in 1941; he designed a ceiling for the Philips headquarters in Eindhoven in 1951. He designed tiled pillars for two schools: Maris College in The Hague in 1959 and Baarnsch Lyceum, Baarn, in 1969; and the facade for Vrijzinnig-Christelijk Lyceum in The Hague, 1960. Additionally, there was the 1967 commission for a mural for the large post office on the Kerkplein in The Hague, for which Escher extended the metamorphosis composition to seven metres in length, for installation in 1967. See *Metamorphosis III*, 1967–68, woodcut printed from thirty-three blocks on six sheets, mounted on canvas. See Bool, no. 446, in Locher.
18 He was involved in the preparations for a memorial exhibition of de Mesquita's work there in 1946.
19 See J. W. Vermeulen in Escher & Wilson (ed.), p. 144, on Escher's finances. P. Kesler of Arnhem became an important early collector of Escher's prints; see Locher, 'Back in Holland 1941–1954', p. 62.
20 'Het onmogelijke' ('The Impossible'), lecture, home of Garmt Stuiveling, 9 Nov. 1963, in Escher & Wilson (ed.), pp. 135–6 reproduced in this publication, pp. 147–151.
21 M. C. Escher quoted in Escher & Wilson (ed.), 'Other themes', lecture prepared for presentation in various venues in the United States in October 1964 (not given due to illness) p. 66.
22 M. C. Escher, ibid. p. 54.
23 Escher, *The Graphic Work of M. C. Escher*, p. 20.
24 M. C. Escher, 'The regular division of the plane' (1958), in Escher & Wilson (ed.), p. 122. See also Schattschneider, p. 254, who quotes a 1961 letter from Escher to E. H. Gombrich about the relationship between Bach's canons and his regular division of the plane work.
25 Roger Penrose, 'Encounters with Maurits C. Escher', in Steel, p. 12.
26 Roger Penrose designed the picture problems and his father Lionel Penrose assisted, making wooden models of them. They co-authored a short article describing these: L. S. & R. Penrose, 'Impossible objects: a special type of visual illusion',

British Journal of Psychology, vol. 49, no. 1, Feb. 1958.
27 M. C. Escher, letter to Roger and Lionel Penrose, 18 April 1960, carbon copy letter, Collection Gemeentemuseum Den Haag, The Hague, MAP N65, quoted in Micky Piller, Patrick Elliott & Frans Peterse, *The Amazing World of M. C. Escher*, National Galleries of Scotland, Edinburgh, 2015, p. 130.
28 See Patrick Elliott, 'Escher and Britain', in ibid. pp. 29–30. Elliott describes how Escher had written to Coxeter requesting help with extending the reduced geometric pattern right to the outer edge of the circle.
29 M. C. Escher, 'Oneindigheisbenaderingen' ('Approaches to infinity'), originally published in J. Hulkser (ed.), *De Wereld van het Zwart en Wit*, Wereld-Bibliotheek, Amsterdam, 1959, pp. 41–9; this translation in Bruno Ernst, 'Vision of a mathematician', in Locher, p. 153.
30 In August 1960 he was invited to take part in the Fifth Congress and General Assembly of the International Union of Crystallography at Cambridge University, UK. He lectured at the Massachusetts Institute of Technology (MIT) in October 1960. In 1964 an ambitious lecture tour of the USA was cancelled when Escher fell ill and had to have an emergency operation in Canada; all lectures had been prepared, however.

M. C. Escher 1898–1972, p. 20

Quote from M. C. Escher, Acceptance speech upon receiving the Culture Prize of the City of Hilversum, 5 March 1965, quoted in J. L. Locher (ed.), *M. C. Escher: His Life and Complete Graphic Work*, trans. Tony Langham & Plym Peters, Harry N. Abrams, New York, 1992, p. 124.

nendo by Maria Cristina Didero, p. 71

1   A third office was established in Singapore in 2012, once again confirming nendo's increasing global presence.
2   The overall message of the book is that even small and seemingly boring things in our daily routine can enrich our lives and excite us when given a bit more attention.
3   In Japanese, *otaku* means 'maniac', 'obsessed'. In Oki Sato's words, it is 'a guy who is crazy about something, a guy who is really addicted'. Sato has no problem being considered a design fanatic: 'Design is what I like to do. I have no hobbies, I just really enjoy working'. Paola Antonelli is Senior Curator, Department of Architecture and Design, at The Museum of Modern Art (MoMA), New York.

Paola Antonelli, '@curiousoctopus', 6 May 2018, Twitter, <https://twitter.com/curiousoctopus/status/993269199610023936>, accessed 24 May 2018.

4 Oki Sato's favourite cartoon is *Doraemon*, created by Fujiko F. Fujio in 1969.

5 *La comédie humaine (The Human Comedy)* is a series of novels and short stories, published between 1829 and 1847, by French writer Honoré de Balzac (1799–1850). The series examines French society from the time of the French Revolution (1787–89) up to the eve of the 1848 revolution.

6 nendo, 'Concept', *nendo*, <http://www.nendo.jp/en/concept/>, accessed 16 Aug. 2018.

A House for Escher by Ewan McEoin, p. 97

1 All Oki Sato quotes from interview with Ewan McEoin, July 2018.

Exhibition design, p. 112

Quote from interview with Ewan McEoin, July 2018.

House for Escher collection, p. 130

Quote from interview with Ewan McEoin, July 2018.

The Impossible by M. C. Escher, p. 147

This text is an edited transcript of a lecture by Maurits Cornelis Escher at the home of Dutch poet Garmt Stuiveling, on 9 Nov. 1963. See M. C. Escher & Janet Wilson (ed.), *Escher on Escher: Exploring the Infinite*, trans. Karin Ford, Harry N. Abrams, New York, 1989, pp. 135–6.

Escher: close up by Dunja Hak, p. 153

1 Clement Cheroux, 'A sense of context: amateur photography in late nineteenth century', in Elizabeth W. Easton (ed.), *Snapshot: Painters and Photography 1888–1915*, Yale University Press, New Haven, 2011, pp. 40–1.

2 Mary Warner Marien, *Photography: A Cultural History*, 2nd edn, Laurence King, London, 2006, pp. 167–70.

3 Flip Bool et al., *Dutch Eyes: A Critical History of Photography in the Netherlands*, Waanders Publishers, Zwolle, 2007, pp. 112–18.

4 J. R. Kist, 'Early life 1898–1922', in J. L. Locher (ed.), *M. C. Escher: His Life and Complete Graphic Work*, trans. Tony

Langham & Plym Peters, Harry N. Abrams, New York, 1992, p. 15.

5 *Self-portrait*, May 1917, linocut, no. 9, in F. H. Bool et al., 'Catalogue', in Locher.

6 *Man standing*, 1920, woodcut, no. 52, in Bool, in Locher.

7 *Head of a child*, 1916, linocut, no. 4, in Bool, in Locher.

8 *Fiet van Stolk-Van der Does de Willebois*, 1918, linocut, no. 21, in Bool, in Locher; *Roosje Ingen Housz*, 1920 or 1921, lithograph, no. 63, in Bool, in Locher.

9 Wim Hazeu, *M. C. Escher, een biografie*, Muelenhoff, Amsterdam 1998, p. 29. Hazeu mentions that these reproductions had a place in several of Escher's workshops throughout his life. Other reproductions in his possession included Albrecht Dürer, *The four apostles*, c. 1526; Jan van Eyck, *Portrait of Margareta van Eyck*, 1439; Hans Holbein, *Portrait of Robert Cheseman (1485–1547)*, 1533; Hans Memling, *Triptych of Jan Floreins*, 1479, *Portrait of a man with a Roman coin*, c. 1480, *Diptych of Maarten van Nieuwenhove*, 1487 (twice); Rembrandt van Rijn, *The sampling officials of the Amsterdam drapers' guild*, 1662.

10 Escher was so inspired by Hieronymus Bosch that he copied a detail of *The garden of earthly delights*, c. 1505, in his print *Hell, copy after Hieronymus Bosch*, in November 1935. See no. 278 in Bool, in Locher. More than two decades later he used two figures from this same painting in his print *Belvedere*, 1958.

11 Hazeu, pp. 16–17. Hazeu describes G. A. Escher's stay in Japan and the possession of Japanese objects and art in the Escher household, such as the work of Hokusai.

12 *Cattolica di Stilo, Calabria*, 1930, lithograph, no. 139, in Bool, in Locher.

13 *Marseille*, 1936, wood engraving, no. 290, in Bool, in Locher.

14 J. R. Kist, 'Switzerland and Belgium 1935–1941', in Locher, p. 50.

15 Mariet Westermann, 'Adriaen van der Venne, Jan Steen, and the art of serious play', in *De zeventiende eeuw*, no. 15, 1999.

16 Pliny the Elder, *Natural History, A Selection*, trans. John F. Healy, Penguin Books, London and New York, 1991, p. 330. 'In a contest between Zeuxis and Parrhasius, Zeuxis produced so successful a representation of grapes that birds flew up to the stage-buildings where it was hung. Then Parrhasius produced such a successful trompe l'oeil of a curtain that Zeuxis, puffed up with pride at the judgement of the birds, asked that the curtain be drawn aside and the picture revealed. When he realized his mistake, with an unaffected modesty, he conceded the prize, saying that whereas he had deceived birds, Parrhasius had deceived

him, an artist.' This story remained for many Old Masters the example of what a good artist was supposed to do: fool the beholder with his talents.

17 *Metamorphosis I* was created with two wood blocks and is Escher's first big tessellation. In this print Atrani is depicted in mirror image. In *Metamorphosis II* Escher extended *Metamorphosis I* with eighteen blocks, and it shows Atrani from the right, see Bool no. 320, in Locher.

18 Micky Piller, Patrick Elliott & Frans Peterse, *The Amazing World of M. C. Escher*, National Galleries of Scotland and Gemeentemuseum Den Haag, Edinburgh and The Hague, 2015, pp. 78–9.

M. C. Escher: Early years, p. 170

Quote from M. C. Escher, *The Graphic Work of M. C. Escher*, revised and expanded edn, trans. John E. Brigham, Oldbourne, London, 1967, p. 9.

An un-visceral reality: Escher and the virtual by Adam Nash, p. 207

1 Bruno Ernst, 'Selection is distortion', in Doris Schattschneider & Michele Emmer (eds), *M.C. Escher's Legacy: A Centennial Celebration*, Springer-Verlag, Berlin and Heidelberg, 2003, p. 9.

2 M. C. Escher, *M.C. Escher: The Graphic Work*, Taschen, Cologne, 2016, p. 20.

3 C. H. MacGillavry, *Symmetry Aspects of M. C. Escher's Periodic Drawings*, Oosthoek, Utrecht, 1965. Reprinted as *Fantasy and Symmetry: The Periodic Drawings of M. C. Escher*, Harry N. Abrams, New York, 1976, p. viii, quoted in Doris Schattschneider, 'The mathematical side of M. C. Escher', *Notices of the AMS*, vol. 57, no. 6, p. 716.

4 Escher, p. 12.

5 Escher, p. 16.

6 Schattschneider, 'The mathematical side of M. C. Escher', p. 706.

7 Escher Reality, <http://www.escherreality.com>, accessed 30 April 2018.

8 J. W. Vermeulen, 'I'm walking around all by myself here', in M. C. Escher & Janet Wilson (ed.), *Escher on Escher: Exploring the Infinite*, trans. Karin Ford, Harry N. Abrams, New York, 1989, p. 147.

9 M. C. Escher, 'Approaches to infinity', in J. L. Locher (ed.), *The World of M. C. Escher*, Harry N. Abrams, New York, 1972, p. 15.

10 G. Escher 'Addendum' to H. S. M. Coxeter, 'Escher's fondness for animals', in Schattschneider & Emmer, pp. 3–4.

11 *Tree*, 1919, woodcut, no. 34, in F. H. Bool et al., 'Catalogue', in J. L. Locher (ed.), *M. C. Escher: His Life and Complete Graphic Work*, trans. Tony Langham &

Plym Peters, Harry N. Abrams, New York, 1992.

12 Ernst Haeckel, *Art Forms in Nature*, Prestel-Verlag, Munich, 1998.

13 Roberta Smith, 'Just a nonartist in the art world, but endlessly seen and cited', 21 Jan. 1998, *The New York Times*, <https://www.nytimes.com/1998/01/21/arts/art-review-just-a-nonartist-in-the-art-world-but-endlessly-seen-and-cited.html>, accessed 30 April 2018.

14 See my article 'Art imitates the digital', *Lumina Journal*, vol. 11, no. 2, 2017, <https://lumina.ufjf.emnuvens.com.br/lumina/article/view/746>, accessed 30 April 2018.

Games that explicitly reference Escher: *Echochrome* (official sites discontinued; previously <echochromegame.com> and <http://www.jp.playstation.com/scej/title/mugen>)
Antichamber <http://www.antichamber-game.com>
The Bridge <http://thebridgeisblackandwhite.com>
Manifold Garden <http://manifold.garden>
Fragments of Euclid <https://nusan.itch.io/fragments-of-euclid>
Back to Bed <https://www.bedtime.io/back-to-bed>
HyperRogue <http://roguetemple.com/z/hyper>

M. C. Escher: Regular division of the plane, p. 218

Quote from M. C. Escher, letter to Dr A. W. M. Pompen, 3 Nov. 1951, quoted in J. L. Locher (ed.), *M. C. Escher: His Life and Complete Graphic Work*, trans. Tony Langham & Plym Peters, Harry N. Abrams, New York, 1992, p. 67.

Dimensionality and play in Escher and nendo by Alberto Pérez-Gómez, p. 261

1 Jeff Malpas, *Place and Experience: A Philosophical Topography*, Cambridge University Press, Cambridge, 2007.

2 Martin Jay, 'Sartre, Merleau-Ponty and the search for a new ontology of sight', in David Levin (ed.), *Modernity and the Hegemony of Vision*, University of California Press, Berkeley, 1993, p. 164.

3 Maurice Merleau-Ponty, *Phenomenology of Perception*, Routledge & Kegan Paul, London, 1962, p. 235.

4 See Evan Thompson, *Mind in Life: Biology, Phenomenology, and the Sciences of Mind*, Harvard University Press, Cambridge, MA, 2010, pp. 276–7. Thompson cites J. Kevin O'Regan (1992): 'Despite

the poor quality of the visual apparatus, we have the subjective experience of great richness and "presence" of the visual world. But this richness and presence are actually an illusion'.

5 Maurice Merleau-Ponty, 'Cézanne's doubt', in *Sense and Non-Sense*, Northwestern University Press, Evanston, 1964.

6 See also Alva Noë, *Varieties of Presence*, Harvard University Press, Cambridge, MA, 2012. Most art historians and critics interested in this problem tend to polarise the discussion on either of these sides. Renaissance scholars Martin Kemp and Samuel Edgerton would generally argue that the representational techniques invented in the Renaissance are 'correct' and universal, while disciples of Michel Foucault, such as Jonathan Crary, tend to emphasise the radical historicity of all forms of representation.

7 Maurice Merleau-Ponty, quoted by Edward S. Casey in M. C. Dillon (ed.), *Merleau-Ponty Vivant*, State University of New York Press, Albany, 1991, p. 20. Casey is citing from a recent translation by Richard McCleary. See Maurice Merleau-Ponty, *The Primacy of Perception and Other Essays on Phenomenological Psychology, the Philosophy of Art, History and Politics*, Northwestern University Press, Evanston, 1964.

8 ibid. pp. 20–1.

9 Merleau-Ponty, *Phenomenology of Perception*, pp. 264–5.

10 See, for example, Stuart Kauffman, *Reinventing the Sacred, a New View of Science, Reason and Religion*, Basic Books, New York, 2008.

11 Hans-Georg Gadamer, *The Relevance of the Beautiful and Other Essays*, Cambridge University Press, Cambridge, 1986, pp. 31–9.

12 Rima Sabina Aouf, '"Technology should look like something in your grandmother's room" says Oki Sato', 7 Aug. 2017, *Dezeen*, <https://www.dezeen.com/2017/08/07/oki-sato-designer-interview-technology-should-look-like-something-in-grandmothers-room/>, accessed 8 March 2018.

13 Michel de Certeau, *The Practice of Everyday Life*, University of California Press, Berkeley, 1984.

14 I discuss in detail these concepts and the importance of habits for architectural meaning in my recent book *Attunement: Architectural Meaning after the Crisis of Modern Science*, MIT Press, Cambridge, MA, 2016, chapter 5.

15 See, for example, Gadamer, pp. 22–31; Johan Huizinga, *Homo Ludens: A Study of the Play Element in Culture*, Beacon Press, New York, 1971; Eugen Fink, *Le jeu comme symbole du monde*, Les Éditions de Minuit, Paris, 1966; Mihai Spariosu,

Dionysus Reborn: Play and the Aesthetic Dimension in Modern Philosophical and Scientific Discourse, Cornell University Press, Ithaca, NY, 1989.

5 I paraphrase from Gianni Vattimo's concept of 'weak truth' and his interpretation of Heidegger's understanding of technology in relation to artistic practices. Vattimo argues that a strategy to deal with the dangers of technology is to grasp the 'weakness' of the truths upon which technology bases its premises. See Gianni Vattimo, *The End of Modernity*, Johns Hopkins University Press, Baltimore, 1991, p. 55ff.

M. C. Escher: Exploring space and the impossible, p. 270

Quote from M. C. Escher, letter to Dr J. W. Wagenaar, 16 Jan. 1953, quoted in J. L. Locher (ed.), *M. C. Escher: His Life and Complete Graphic Work*, trans. Tony Langham & Plym Peters, Harry N. Abrams, New York, 1992, p. 68.

***Escher X nendo: Between Two Worlds* by Oki Sato, p. 299**

This text is an edited extract of an interview with Ewan McEoin, July 2018.