Was Alois Riegl Colour Blind?

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'*Form without colour is like a body without a soul*'
Owen Jones

Abstract *In his formalist art history, Alois Riegl (1858-1905) focuses on figure and ground, light and dark, and tactile versus optical features. Strangely, he shows little interest in colour. Thus, in* Stilfragen *(1893) and in* Spätrömische Kunstindustrie *(1901) artefacts and monuments are discussed as if they were fashioned in black and white. Even when describing mosaics and book illuminations, Riegl refrains from mentioning specific colours. In connection with baroque painting (*Die Entstehung der Barockkunst in Rom*, 1908) the almost total lack of colour description is even more striking. Although Riegl may have found form to be more objective than colour, and he also relied heavily on black and white reproductions, another explanation for his exclusion of chromatic features could be that he did not see colour well. The article proposes that Riegl may have been among the 8-10 per cent of males who suffer from colour vision deficiency.*

Keywords: Alois Riegl, art historiography, colour vision deficiency, deuteranopia, deuteranomaly, protanopia, protanomaly, red-green colour blindness

Lack of Colour in *Stilfragen* and in *Spätrömische Kunstindustrie*

The architect and designer Owen Jones' *Grammar of Ornament* published in 1856 contains 112 colour plates. These are folio-sized chromolithographs, by then a new and expensive technique. The accompanying text, with line drawings, discusses ornaments from diverse periods and cultural contexts, from Egypt and Greece to Ireland and the Muslim world, India and China.[1] In Jones' publication form and colour appear as equally important components of the beautiful and intricate ornaments. When pertinent, as in the chapter on Pompeian wall painting, Jones specifies the colours, such as black, red, blue, green and yellow.

By contrast, Alois Riegl's study *Stilfragen. Grundlegungen zu einer Geschichte der Ornamentik* (*Problems of Style. Foundations for a History of Ornament*) from 1893 leaves out colour completely. The book contains 346 pages with 197 illustrations, mainly line drawings and a few photographs, all in black and white. In schematic fashion, the text traces the evolution of naturalistic forms as stylised ornaments from Egypt, through Mycenae and Greece to Byzantium and beyond. Riegl's aim is to show that

[1] Jones 1856 and later editions; the book is still in print; Gombrich 1984, 51-55; Buci-Glucksmann 2008, 24-25.

motifs and pattern-types, like the lotus and acanthus, follow convention rather than technique, that the general structure of a given ornament remains the same whether it is rendered in, for instance, textile, wood, clay or stone.[2] In effect, Riegl's history of ornament is a history of typology rather than a history of style. As far as I can establish by leafing through the book, it does not include a single colour term. Throughout the text, Riegl is consistent in his deployment of a strict 'pattern-recognition' method that leaves aside questions of colour. His formalist model is self-terminating, given that the focus is on the structural features of the work; once these features are discerned, he need not go any further. In view of his agenda of following the development of formal structures, this is to some extent explicable. However, when it comes to the *Spätrömische Kunstindustrie*, a publication that was meant to be a comprehensive analysis of late Roman art, the method is less understandable.

The *Spätrömische Kunstindustrie nach den Funden in Österreich-Ungarn* was commissioned in 1893 and originally intended as a publication of the artefacts in the Kunsthistorische Museum in Vienna, where Riegl held a position as an assistant keeper. By the time the book was published in 1901, he had become a professor of art history and the book had changed its scope to include chapters on architecture, sculpture and painting/mosaics as well as a final discussion of the elusive term *Kunstwollen* (artistic will, will to art).[3] In accordance with this augmented scope, in the second, posthumous edition from 1927, edited by Otto Pächt, the subtitle was removed. However, it was still titled *Kunstindustrie* (Art Industry) rather than *Kunst* (Art), a point being that there should be no sharp distinction between so-called fine and applied art.[4]

The chapter on painting (*Malerei*) covers wall mosaic and book illuminations mainly from Rome; wall painting is not included, since it was to be treated in a follow-up volume. It is noticeable that this short chapter of some twenty-six pages

[2] For *Stilfragen*, see e.g. Olin 1992, 3-89; Iversen 1993, 48-68; for ornament, Gombrich 1984, 182-193.

[3] Recent studies of *Kunstwollen* include Reichenberger 2003; Elsner 2006; Oliveira 2013. For other aspects of Riegl, see Woodfield (ed.) 2001 and Elsner 2021 with abundant references. For Riegl's impact on the study of late antique art, see Kiilerich 2007 and Kiilerich forthcoming.

[4] The second edition from 1927 is divided as follows: Introduction (22 pages); Architecture (60 pages); Sculpture (150 pages); Painting (26 pages); Applied art (125 pages); Kunstwollen (17 pages). The first edition from 1901 was in folio format and the illustrations differed from those of the second. For the choice of illustrations for the first and second editions, see Lockard 2016. I have used the reprint from 2000 of the 1927-edition. Hereafter cited as Riegl *SK*.

Fig. 1 S. Costanza, Rome. Mosaics in barrel vault. Photograph: B. Kiilerich.

on two-dimensional art makes up only about 7 per cent of the total text.[5] The churches with mosaics that Riegl includes are Sa Costanza (*Fig.* 1), Sa Pudenziana and Sa Maria Maggiore in Rome, and San Vitale at Ravenna. The mosaics in Sa Costanza are characterised as dark (p. 244, 'dunkle Farben'). The mosaics are heavily restored; however, both the new and the original parts are anything but dark. The Justinian panel in San Vitale is examined with emphasis on the spatial isolation of the individual figures.[6] Despite the fact that a leading characteristic of these wall mosaics is the coloured glass in bright hues, there is no mention at all of colour, nor does Riegl address these features in the accompanying Theodora panel, which is left out altogether.[7]

The lack of specific colour words and colour description is especially remarkable when the subject is painting. In search of colour terms, I have found one mention of green in the Vatican Vergil manuscript (p. 260) and one reference to gold in the Vienna Dioskurides (p. 263). In the dedication page of the latter, the putti that work as craftsmen are presented as 'goldene Genien'. From an art

[5] Riegl *SK*, 237-263.
[6] Riegl *SK*, 251 'räumliche Isolierung der Einzelfiguren'.
[7] Published in the same year, Julius Kurth provides a detailed colour description of the mosaics, Kurth 1901, Justinian panel, 122-127, Theodora panel, 127-131.

Fig. 2 Pilgrim's flask from Pinguente, Istria. Vienna, Kunsthistorische Museum. Photograph: KHM.

historical viewpoint, it is surprising that apart from this he takes no interest in the fine series of full-page images, the frontispieces being simply referred to as 'some leaves with human figures'.[8] Riegl focuses on the use of light and shade in the plant images. Since this lavishly illustrated manuscript is kept in the Österreichische Nationalblibliothek, Riegl must have known it from autopsy.[9]

[8] Riegl *SK*, 262 'einige Blätter mit menschlichen Figuren'.

[9] The Anicia Juliana dedication page had alaready been published in a chromolithograph by Jules Labarte in 1866. A facsimile edition by von Premerstein was published in 1906; later facsimile editions include those by Gerstinger in 1979; and most recently, in reduced format, by Mazal 1998.

Another work he was able to study by autopsy was the second-century pilgrim's flask from Pinguente, Buzet in Istria (Vienna, Kunsthistorisches Museum; bought in 1866) (*Fig.* 2). This artefact provides an exceptional instance where Riegl does address colour: the exterior of the flask is covered in *champlevé* inlays of lacquer red, cobalt blue and orange-yellow.[10] In a footnote Riegl calls attention to two earlier publications, which both depict the flask in colour.[11] The interplay of the burnished bronze and the strong chromatic values of the inlays is the most important feature of the work. Riegl, however, shows the object in black and white and in his extensive visual analysis puts the main emphasis on the design.

Polychromie and flickering Kolorismus

Riegl deploys the term *Kolorismus* (some forty times) and *Polychromie* (about twelve times); still, despite the chromatic tenor, these terms do not relate to colour and hue but serve to characterise relations between figure and ground, and variant optical impressions.[12] *Kolorismus* (colorism) is designated as something flickering and moving unsteadily. On the subject of late Roman capitals, Riegl finds that the *Kolorismus* brings about a 'restless, flickering impression'.[13] Discussing a floral scroll on a marble pilaster in the Lateran museum, he presents *koloristischen* and *optisch-farbigen* as an interchange between light pattern and dark ground.[14] If we imagine the pilaster, like the capitals, to originally have been painted with the grapes and leaves and other elements rendered in a variety of colours, the dichotomy of light and dark and the optical impression would have been very different from how the relief appears in its current colourless state. Not least, colour would have influenced the degree of contrast experienced by the viewer. As pointed out by Bernard Berenson: 'If we agree that the plastic monuments of late Antiquity were painted and gilded, the talk of the Riegls and Wickhoffs about deliberately thought-out preference for the play of light and shade […] would turn out to be ill-founded'.[15]

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[10] Riegl *SK*, 354-358: 'Lackrot, Kobaltblau, Orangegelb' (354). Lacquer red is a slightly problematic colour term, as it may refer to various substances from seals to varnish. Cobalt was used as a colouring agent in medieval smalt, but the pigment called cobalt blue is a synthetic substitute for ultramarine, created in 1802 by the French chemist Louis-Jacques Thénard, Ball 2009, 178-179.

[11] Von Sacken 1883 with coloured detail 43, fig. 4; de Linas 1884 with colour plate 18-19. In both chromolithographs the red is a little too dark in comparison with modern photographs of the flask. Von Sacken: 'smalteblau, purpurroth und orangegelb'. De Linas, 134: 'bleu lapis et rouge brique', 135: 'bleu de cobalt'.

[12] According to the index of the *SK*, the term *Kolorismus* is found on the following pages: 73f, 80, 93, 136, 148, 174, 184, 209, 240, 255, 272, 275, 276, 279, 280, 288, 291, 294, 296, 308, 310, 315, 316, 317, 329f, 333f, 337, 339f, 344, 350f, 356f, 363f, 365, 369f, 382f, 384, 386f, 400.

[13] Riegl *SK*, 74 'eine unruhige, flackerne Wirkung'.

[14] Riegl *SK*, 136 'lichten Muster und dunklem Grund'.

[15] Berenson 1954, 19.

Whereas Riegl associates *Kolorismus* with late antiquity, he associates *Polychromie* with classical Greek art and architecture.[16] *Polychromie* is posited as an antithesis to *Kolorismus*: the tactile polychromatic (*taktisch-polychromistisch*) versus the optical colouristic (*optisch-koloristisch*) (p. 365). It is held that in the Egyptian *Polychromie* colour is used to strengthen the isolating effect of the outline. It is interesting to note that Riegl does not envisage the Egyptian colours to serve any other purpose than to make the outline appear clearer. In sum, while Riegl notices the 'colouristic' effects of flicker and surface motion, he refrains from the use of actual colour words. His *Kolorismus* is colouring without a hue, a visual effect of the carvings in their presumed achromatic state. *Kolorismus* is largely an optical phenomenon, while *Polychromie* is closer to the tactile or haptic. Riegl conceives the history of art from Egypt to late antiquity as a shift from tactile to optic modes of perception.[17] The two terms are used mainly for applied arts, the gold and enamel objects, and less so for larger monuments including mosaics. In any event, the terms do not describe approaches to the use of colour in the sense of hue, saturation and luminance, but rather outlines two manners of subsuming colour into form. The paradox is that the chromatic is achromatic.

Sculptural polychromy, however, is addressed in one of Riegl's most ambitious endeavours, the *Historische Grammatik der Bildenden Künste (Historical Grammar of the Fine Arts)*, which exists in two unfinished versions, the first manuscript draft dating from 1897/98, the second from 1899. The publication of the two texts only took place as late as 1966.[18] In connection with form and surface, Riegl turns to the subject colour ('Farbe', pp. 295-298) especially in Egyptian art, which may or may not be painted. If the porcelain figures were painted it was only because the plain clay did not sufficiently excite the eyes. To cover the clay in Egyptian porcelain figures one used complementary green and red, violet and yellow, or alternatively red and blue, yellow and white (p. 298). The reference to violet, by the way, seems incorrect as it is generally held that violet was not part of the Egyptian palette.[19] In the first version of the *Grammatik*, Riegl states: 'Colour is something inessential and does not need to be taken into consideration by an art that principally seeks to improve nature', and further: 'a crystalline art work requires no colour at all'.[20] In

16 Riegl *SK* 330 'der Polychromie der klassischen Antike und dem Kolorismus der ausgehenden Antike'. The term *Polychromie* is found on 14, 96, 98, 240, 330, 332, 333f, 346, 348, 356f, 364, 365.
17 Ernst Gombrich subsequently stated that 'the history of art from ancient Egypt to late antiquity is the history of the shift of the Kunstwollen from tactile to visual or 'optic' modes of perception', Gombrich 1984, 196.
18 Riegl 1897/98 and 1899, Karl M. Swoboda & Otto Pächt (eds) 1966. The *Grammatik* can be found in various translations, English from 2004; French from 2015, etc.
19 Lucas 1962, 338-351 lists pigments that could produce black, blue, brown, green, grey, orange, pink, red, white and yellow. For more recent studies, see e.g. Baines 1985; Davies 2001.
20 Riegl 1897/98 (1966), 138: 'Die Farbe ist somit etwas Unwesentliches und braucht von einer grundsätzlich naturverbessernden Kunst nicht berücksichtigt zu werden'; 'das rein kristallinische Schaffen verlangt überhaupt keine Farbe'.

relation to the sculpting of the pupil in Roman portraits, he asks: 'What use was there for polychromy when form itself could replace colour'?[21] In sum, even though Riegl in this text addresses the question of sculptural polychromy and provides interesting observations on different kinds of polychromatic treatments in Egyptian art, the overall attitude to applied colour is dismissive.

Colourless baroque paintings

The book about baroque art and architecture in Rome, *Die Entstehung der Barockkunst in Rom*, is based on Riegl's lecture notes from 1898/99 and 1901/02, edited by Arthur Burda and Max Dvorák and published posthumously in 1908. It is noticeable that Riegl again is more interested in architecture than in art, painting taking up only around 25 per cent of the text.[22] The first colour term occurs after twenty-five pages: the discussion of Guido Reni's *Massacre of the Innocents* (Bologna) contains a reference to a vermillion sleeve ('Zinnoberrote Ärmel', p. 178). The red sleeve is conspicuous, but so are the strong yellow and the dark blue, and the contrasting paler blues that Guido Reni employs. None of those hues appear in the text. The colours of the ceiling fresco of Aurora (Casino dell'Aurora, Palazzo Rospigliosi) 1614 are described as 'fresh, delicate, hazy'.[23] Riegl observes the golden shine that issues from Apollo and the deep blue sea. While gold and blue are colour terms, they are close to clichés: one may speak, in a general way, about the deep blue sea and gold comes easily to mind in reference to the Sun-god Apollo; moreover the golden background that dominates the painting is hard to overlook. Significantly, Riegl omits a mention of the light golden yellow dress worn by Aurora, and the light blue, plum red and pale green of the Hours.

Not only are colour words few and far between, but when they do occur, it turns out that they merely echo the words of other authors: thus, the section about Caravaggio derives from Bellori, according to whom Caravaggio does not use Zinnoberrot und Azurblau (p. 205), as indeed it transpires from the Italian text: 'Non si troua però che egli usasse cinabri, nè azzurri nelle sue figure'.[24] Riegl consulted an impressive number of publications when he wrote his lecture texts. He refers to recent books as well as to earlier sources.[25] In connection with Guido Reni's *Madonna and child in glory with the patron saints of Bologna* (1630), Riegl notes that *Zinnoberrot* and dark blue have given way to *himmelblau* and *rosenrot* in the Virgin's garments (p. 181). The painter has become a Hellmaler, light-painter. This partly

[21] Riegl 1897/98 (1966), 164: 'Wozu bedurfte es da noch der Polychromie, wenn die Form selbst die Farbe zu ersetzen wusste?'.
[22] Riegl 1908, 153-207. The book has been reprinted in 1987; an English edition, *The Origins of Baroque Art in Rome*, A. Hopkins & A. Witte (eds), was published in 2010 by Getty Publishing.
[23] Riegl 1908, 180 'frisch, zart und duftig'. Duftig may mean fragrant but since this is a visual artwork, the intention is rather hazy or airy.
[24] Bellori 1672, 201-216, at 212; Riegl 1908, 20-27 discusses the writings of Bellori.
[25] Riegl 1908, Literatur, 9-16 (Burckhardt, Janitschek, Strzygowski, Fraschetti, Gurlitt, Wölfflin, Dohme, Schmarsow); Quellen, 17-30 (Vasari, Baglione, Bellori, Passeri, Baldinucci, Malvasia).

echoes the French art historian Louis Viardot, who refers to the painting as 'an excellent specimen of the pale colouring which Guido had adopted'.[26] A main source is a comparatively recent publication by the German art historian Karl Woermann, a debt Riegl duly acknowledges. We can compare the sentences about the painter Alessandro Tiarini:

> '… er liebte grosse Linien, eine plastische Modellierung und studierte Verkürzungen; er bevorzugte matte, violet, gelbliche und hellrothe Töne, die er zu einer milden, kühlen Harmonie zu verschmelzen wusste.'[27]

> '[Von diesem Bilde trifft haarscharf zu, was Wörmann von seiner Weise überhaupt sagt]: dass er grosse Linien, plastische Modellierung und studierte Verkürzungen liebte. Im Kolorit bervorzugt er ein mattes Violett, Gelblich und Rotbraun; milder kühler Gesamtton.' [28]

Woermann's statement that Tiarini 'was fond of strong lines, plastic modelling and elaborate foreshortening and that he preferred opaque violet, yellow and light red tones, which he knew to blend into a mild cool harmony' is repeated almost *verbatim* by Riegl, the main difference being that light red (hellroth) has become reddish brown (rotbraun). In sum, baroque paintings are treated much like the antique material with little interest in aesthetic and stylistic features. Colour terms are rare, and when they do appear, they are not based on Riegl's own observations but adopted from earlier authors.

Colourless description as a scientific method

In view of the number of treatises on colour theory and colour science that had been published by the late nineteenth century, the scientifically-inclined Riegl's disregard of colour in art is surprising. Studies that had appeared within the last generation included those by Charles Blanc (1870) and Ogden Rood (1879), and not least *Die Farbenlehre im Hinblick auf Kunst und Kunstgewerbe* by Wilhelm von Bezold (1874).[29] On

[26] Viardot 1875, 318. It is uncertain whether Riegl used this source. Much had by then been published about Guido Reni, e.g. C.C. Malvasia, *Felsina pittrice. Vite de' pitturi bolognesi*, 2 vols, Bologna 1678 (1841), to whom Riegl refers Riegl 1908, 30.
[27] Woltmann & Woermann 1879, 161.
[28] Riegl 1908, 199.
[29] For an overview, see Kemp 1990, 285-322, esp. 312-322. Earlier treatises included those by Goethe 1810, Runge 1810 and Chevreul 1839.

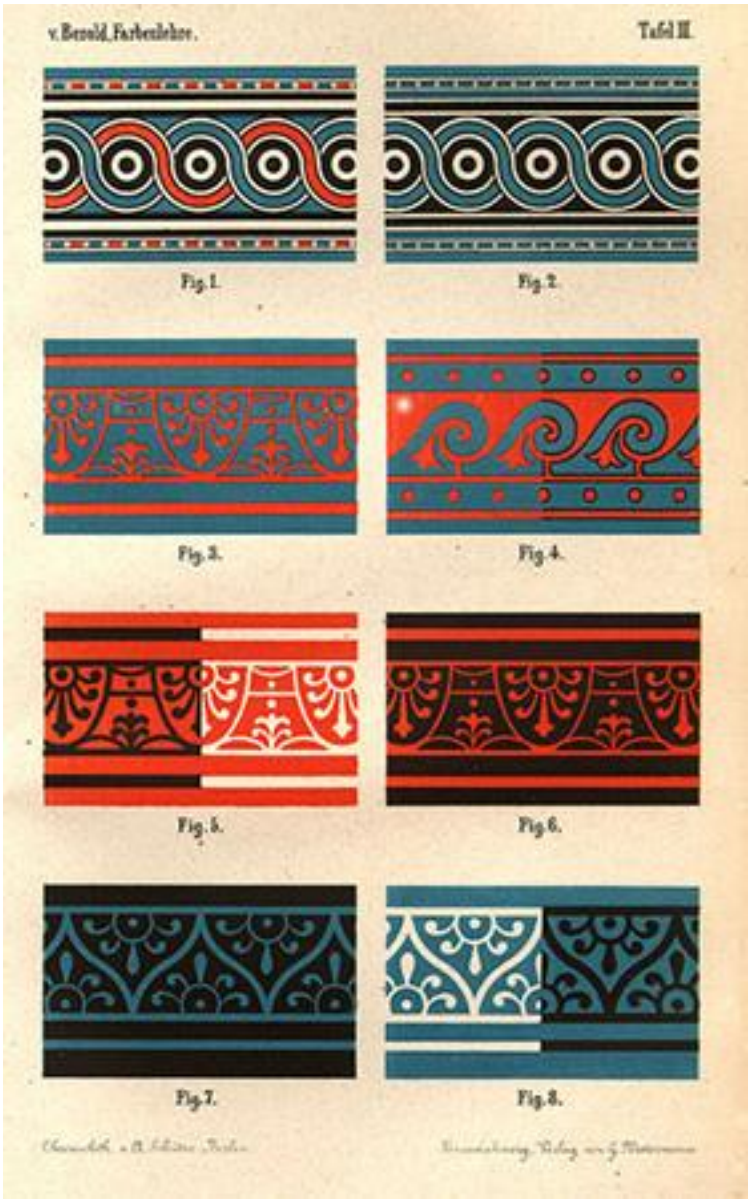

Fig. 3 Bezold, colour assimilation. After W. Bezold, Die Farbenlehre 1874, pl. III.

the question of figure and ground, often treated by Riegl as a dichotomy of light and dark, Bezold demonstrates how colour makes a huge difference to perception: a black design on a blue ground next to a white design on the same blue ground produces the impression of two different hues, a dark blue and a light blue, an instance of colour assimilation or colour spreading. Similarly a pattern appears darker when lined with black and lighter when lined with white (*Fig.* 3).[30] The implication for relief sculpture is obvious: the relationship between figure and ground that Riegl tends to describe from the uncoloured carved surface as a light/dark dichotomy would actually vary in its intensity according to the (no-longer-

[30] Bezold 1874, pl. III; cf. Gombrich 1961, 309, fig. 251; Kiilerich 2011, 181, 182 fig. 11.

extant) original colours. Thus, the visual effect and the impression of a relief such as the Lateran pilaster would depend as much on the applied paint as on the sculpted matrix. But Riegl does not acknowledge the existence of an original sculptural polychromy. He believes that in later antiquity sculpture was no longer painted; as noted above: 'What use was there for colour, when the form alone could do the trick'. Significantly, Riegl never entertains the idea of colour on the Arch of Constantine, a work to which he devotes many pages.[31]

While a disregard of a potential sculptural polychromy is defendable, given that it is difficult to assess no-longer-extant features, it does seem strange to neglect the actual colours of painting and mosaic. Riegl's restriction of chromatic features to a dichotomy of dark and light therefore calls for an explanation. The dismissal of colour could be a methodological choice, Riegl finding that the structure of a visual image, e.g. the design of a relief or the pattern of a textile, is best and most neutrally epitomised by its outlines. This may imply that he finds the perception and description of colour to be subjective to a greater degree than form. To some extent, this is correct, since a given hue can take on a large number of shades, tones and saturations, and colour perception is subjective.[32]

It is telling that in the few instances of the *Spätrömische Kunstindustrie* when Riegl does mention colours in relation to specific art works and artefacts, mainly to applied arts, the objects are in Vienna and thus could be studied by autopsy. Except for these, he appears to have based his descriptions on reproductions, mainly black and white photographs.[33] For the Arch of Constantine, he refers to the photographs by Anderson (p. 85). Riegl also admits having used photographs to characterise the style of the S. Maria Maggiore mosaics (p. 246). The lack of colour designations might therefore be explained as the result of a reliance on black and white reproductions. Still, although most graphic and photographic reproductions at his disposal around 1900 were in black and white, coloured reproductions of archaeological artefacts did exist: for instance, the facsimile of the Vatican Vergil (Vat. lat. 3225), and publications of Pompeian monuments in colour.[34] Moreover, when visiting museums and monuments an art historian would be expected to take notes and write down pertinent information such as colour.[35] That Riegl failed to do so therefore requires an explanation that goes beyond technological and methodological reasons.

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31 Riegl *SK*, 85-94; Kiilerich 2007, 9, 16-18.

32 Compare the debate over 'The Dress', a digital image of a dress that some viewers perceived as white and gold others as blue and black, see e.g. Hesslinger & Carbon 2016.

33 For Riegl's choice of photographs, see Lockard 2016; further Kiilerich forthcoming.

34 Ehrle 1899; Pompeii: Niccolini 1862.

35 Riegl travelled to various parts of Europe: He stayed in Rome for six months in 1884 and for three months in 1887. He made two short trips to Rome in 1899 and 1900, see e.g. Winkes in Riegl 1985, xii-xvi.

Was Riegl colour blind?

The lack of appreciation of colour might indicate that Riegl was visually impaired in some way that caused problems with the perception of colour. He may have been colour blind — either experiencing total colour-blindness (*achromatopia*) or, as is more common and therefore most likely, partial colour-blindness. Since colour-blindness, which for genetic reasons is predominantly present in males, is a vision deficiency that affects about 8 to 10 per cent of the male population, it is not unreasonable to entertain the possibility.[36] In red-green colour blindness there are two types of inherited colour vision deficiency: *protanopia* in which the red end of the spectrum cannot be discerned due to the absence of L-cone pigment and *deuteranopia* in which one cannot discriminate between red-green hues due to a lack of M-cones.[37] Milder forms are *protanomalia* and *deuteranomalia*.[38] Colour vision deficiency does not imply that one cannot see colours at all, but rather the inability to differentiate between certain colours and to distinguish between shades of similar colours. For instance, to a red-green colour blind person, a red apple and a green apple appear more or less the same dull greenish colour. Different degrees of colour vision deficiency exist: some can see colours normally in good light but have difficulty in dim light. A colour deficient person may have heightened sensitivity to light and shadow.

It was only in 1798 that the chemist John Dalton (1766-1844), who was red-green colour blind himself, studied the phenomenon that came to be known as 'Daltonism'.[39] Whether Riegl may have been colour blind is obviously purely hypothetical, since – as far as I am aware – no available medical information with regard to his eyesight exists (except that photographs depict him wearing glasses from an early age).[40] Riegl may theoretically have suffered without knowing, or showing, it. Visual studies were not the Austrian's first choice. He studied law and

[36] For colour vision deficiency (CVD), see Simunovic 2010; Marmor 2016, 2017. Simunovic 2016 gives the number as 8 per cent, Livingstone 2002, 34 as 10 per cent; geographical variations must also be considered, as Caucasian Europeans have the highest rate. Less than 1 per cent of women are colour vision deficient. About colour-blind artists, Marmor 2001, 2016; Marmor & Ravin 2009.

[37] See e.g. Wolf & Scheibner 1982; Simunovic 2010. In addition to the congenital condition, colour vision deficiency can also be acquired, Simunovic 2016.

[38] The protanope is missing the red L-cones (longwave), while the protanomalous is impaired in the L-cones, Wolf & Scheibner 1982. For the deuteranope the problem is lack, or impaired functioning, of the green middle-wave cones.

[39] Dalton 1798, although Dalton saw colours differently, especially pink and red hues, he gives a vivid description of his colour visions and how colours appear very different to him in daylight and by artificial light, Marmor 2017. Hunt *et al.* 1995 extracted DNA from samples of Dalton's eyes and found they lacked pigment for green, i.e. he was not red-blind but green-blind, a deuteranope.

[40] See e.g. Spikic 2010, fig. 2, photograph of Riegl in his youth.

then turned to history and philosophy before taking up art history when he became a member of the Institute of Historical Research.[41]

Are there any indications that Riegl suffered from colour vision deficiency? If we take the Pinguente flask, the exception to the rule of leaving out colour designations, the colours had been described in the two previous publications of the flask. Moreover, one would be able to name red, blue and orange-yellow, without actually seeing the distinct hues, as a colour deficiency would still make it possible to distinguish individual colours only with duller hues that differed from those of people with normal colour vision. A dichromatic person (a protanope or a deuteranope) would therefore use the same colour words as a person of normal vision only the hues would be perceived somewhat differently. According to Riegl, the Pinguente flask displays 'a blurry and flickering treatment of planes'.[42] 'Flimmer' (flicker) is a recurrent term in his texts. This complies with the circumstance that the colour vision deficient has a disadvantage when it comes to a coloured target embedded in a variegated background of a different colour.[43] In Riegl's texts, the few colour words occur mainly in connection with metal objects, such as the Pinguente flask and especially gold jewellery, and it has been observed that the colour deficient find it easier to discriminate hues, if they are bright.

The chapter on painting in the *Spätrömische Kunstindustrie* gives further possible indications of a lack of colour sensitivity. Riegl often presents a surface as 'flimmernd' or 'flackernd', both roughly meaning flickering. Discussing the Vatican Vergil illustrations, Riegl refers to 'the unsteady flickering effect of the contrast of light and shade'.[44] Particularly noticeable is the presentation of the Ship race in the Vatican Vergil, fol. 42r. In the natural scenery of ships and sea, Riegl fails to see the finer nuances of the sky, the rising sun being reduced to 'a light stripe over the horizon in the background'.[45] By contrast, David Wright's description of the illumination reads: 'Delicate horizontal strokes of white and dark blue on top of the medium blue used for the sea establish the receding plane that, near the horizon turns to green, contrasting with the gradations of pink in the distant sky.'[46] Comparing Riegl's words to those of Wright, Riegl's lack of sensitivity to colour is striking. Here, as elsewhere, the general tendency is to contrast dark and light, as if

41 Pächt 1977, 141-142.
42 Riegl *SK*, 358: '… unklarer, kleinlich flimmernder Behandlung der Flächen'.
43 Simunovic 2010, presents an early example, according to Robert Boyle (Some Uncommon Observations about Vitiated Sight, London 1688): a young woman who liked to pick violets could not distinguish them by the colour from the surrounding grass but only by feeling them. During a short trip to Split in 1899, Riegl studied Diocletian's mausoleum, touching the reliefs that he found difficult to see in the dark interior, Riegl *SK*, 161. It is worth noting that Riegl employs the method of a blind person: using touch to 'see'.
44 Riegl *SK*, 261: 'unruhig flackernde Wirkung'.
45 Riegl, *SK*, 260: '... im Hintergrunde über dem Horizonte ein lichter Streif'.
46 Wright 1993, 44.

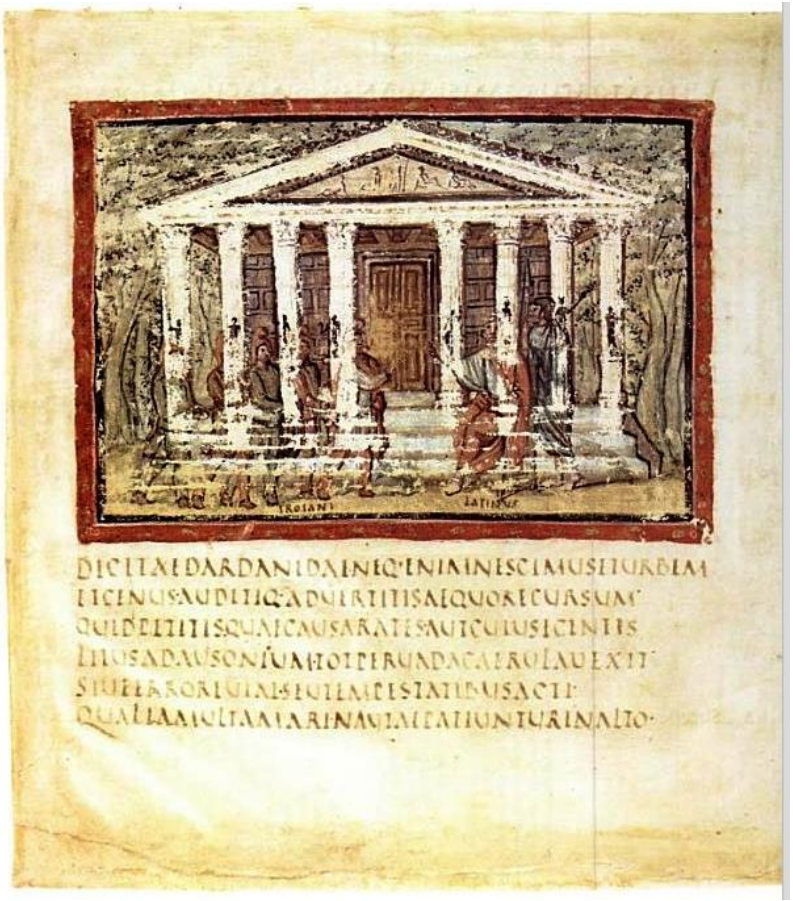

Fig. 4 Vatican Vergil, fol. 60v. Trojan emissaries before King Latinus. Vatican Library, Vat. lat. 3225. Photograph: Wikimedia Commons.

the images were bicoloured, despite the fact that the Vergil manuscript existed in a recent facsimile.[47]

The Vatican Vergil, fol. 60v depicts the Trojan emissaries before King Latinus who is seated in front of a temple framed by trees (*Fig.* 4).[48] Riegl notes the green contours of the trees.[49] If Riegl is looking at a black and white photograph, then how could he establish the colour of the trees (except that green would be a good guess)? If he is describing the coloured reproduction of the facsimile edition published in 1899, or studying the image by autopsy, it is remarkable that the only hue he reflects on is the subordinate green, whereas he finds the large-scale figures in the front

47 Ehrle 1899. Riegl mentions this publication, *SK*, 257.

48 For a colour reproduction, see Wright 1993, p. 64, and Wright 1991, pl. 4a; pl. 4b shows a watercolour facsimile from 1677, commissioned from Pietro Bartoli by Cardinal Massimi, Lansdowne MS. 834, f. 66r, copy of fol. 60v of the Vatican Vergil, British Library.

49 Riegl *SK*, 260: 'der grüne Rahmen der Bäume aussen'.

Fig. 5 Vienna Dioskurides, fol. 6v. Anicia Juliana. Vienna Österr. Nat.bibl. cod. Vind.Med.Gr. 1. Photograph: Wikimedia Commons.

dark.[50] Yet, although the pigments have degraded over time and some paint has flaked off, colour is still visible: Latinus' cloak is bright red, his tunic blue. As elsewhere in the manuscript's depiction of Trojans, the five men are distinguished by the colour of their garments: the first wears blue and red, the next red and yellow (degraded to olive), followed by others in yellow (now olive) with either red or yellow leggings and with red Phrygian caps. Thus, Riegl's inclusion of green but exclusion of red may suggest *protanopia*, red-green colour blindness with the main problem in perceiving red hues, which he sometimes calls dark.[51]

Turning to the 'golden genii' ('goldene Genien') that perform various handicrafts in the Vienna Dioskurides frontispiece (fol. 6v), some appear to have blondish hair, but the figures are not golden in the sense of being covered in gold leaf; gold is lavishly used on the princess Anicia Juliana's attire, the cabled frame and for the background of the author portraits (fol. 3v and 4v). In a coloured

[50] Riegl *SK*, 260: 'dunkle Silhuetten'. Facsimile Ehrle 1899, cf. Wright 1993, 120-121. Earlier editions also existed. The Vatican Vergil can be seen at http://digi.vatlib.it/view/MSS.Vatlat.3225

[51] This is also in keeping with colour blindness, thus Hsia & Graham 1997, 212: 'red should appear darkened for the red blind'.

reproduction, published by Jules Labarte in 1866, more details of the craftsman scenes are preserved.[52] Except for a bluish tint, the hues of the putti are in keeping with the current state of preservation. Colour photographs confirm the impression of figures with white and pale red as the dominant carnation hues, suggesting that the artist rendered natural skin tones. In fact, rather than golden, the putti are painted in close imitation of naturalistic Pompeian predecessors of putti at work (*Fig.* 5).

Based on the *Spätrömische Kunstindustrie* and *Die Enstehung der Barockkunst in Rom*, the possible indications of colour vision deficiency can be summarised as follows:

1. ***Lack of colour terms:*** In descriptions and visual analysis, Riegl very seldom employs colour words. Thus, while a formal analysis of a monument or an artefact may run over several pages, it is usually confined to questions of figure and plane or light and shade. Most tellingly, the lack of colour words goes even for multi-coloured media such as painting and mosaics. The discussion of late Roman painting and mosaics contains merely two colour words in twenty-six pages: a single incorrect reference to gold and another to green. In the chapter on baroque paintings, the first colour term appears after some twenty-five pages of text. Whether consciously or not a person with a lack of sensitivity to colour might avoid the subject.

2. ***Sporadic and random colour descriptions:*** In connection with baroque paintings, Riegl may name one colour but refrains from mentioning other colours in the same picture. Similarly, when presenting late Roman mosaics and paintings, colour words turn up only sporadically and randomly, for instance, describing an illumination in the Vatican Vergil, Riegl remarks upon the green outlines of the trees but fails to mention the bright red, green and yellow in the same picture. A protanope has difficulty distinguishing between red, yellow and green.

3. ***Secondary sources:*** When naming specific hues in paintings, Riegl draws on the work of other authors, his sources ranging from Bellori in the seventeenth century to Woertmann in the nineteenth. A colour vision deficient art historian might prefer to rely on the colour designations of others.

4. ***Acromatic or dichromatic description:*** Riegl expounds both two- and three-dimensional monuments in a dichotomy of light and dark. A colour deficient person, a dichromatic, may have heightened sensitivity to light and shadow.

5. ***Darkness:*** Riegl sometimes perceives images as being dark. For example, the human figures in the Vatican Virgil are called dark; even the brightly coloured Sa Costanza mosaics are perceived as dark. To the colour vision deficient, colours look less bright than to a person of normal vision.

6. ***Flimmer:*** The surfaces of marble reliefs and jewellery are often described as flickering and unsteady. The colour vision deficient has a disadvantage when it comes to a coloured target embedded in a variegated background of a different colour.

[52] Labarte 1866 with colour reproduction.

Conclusion

Riegl's attitude to colour as something secondary and superfluous may have been influenced by several factors, including limited access to study the monuments by autopsy, a reliance on black and white reproductions and a search for objective criteria. Still, Riegl's dismissal of colour could also have been conditioned by a lack of sensitivity to colour caused by colour vision deficiency.

When many chromatic elements are present, Riegl sees 'Flimmer', flicker and blur, and finds it hard to distinguish between figure and ground. Colours that appear to others as being of medium brightness, he sometimes perceives as dark. Coloured images, including paintings, mosaics and book illuminations, are generally described in a dichotomy of light and dark as if they were fashioned in black and white. Colour terms are used extremely sparingly and at times they are cited from other authors. There is thus reason to suspect that Riegl may indeed have been red-green colour-blind. If he did not suffer from protanopia (red-blind) or deuteranopia (green-blind), he might have suffered from one of the milder forms of red-green colour blindness known as protanomaly (red-weak) or deuteranomaly (green-weak). Given that some 8-10 per cent of the Caucasian male population is colour vision deficient, it seems not unreasonable to propose that the 'chromophobic' Alois Riegl counted among them.

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References

Baines, J. 1985: 'Color Terminology and Color Classification: Ancient Egyptian Color Terminology and Polychromy', *American Anthropologist* n.s. 87: 282-297.

Ball, P. 2009: *Bright Earth. The Invention of Colour*. London: Vintage Books.

Bellori, G. P. 1672: *Le Vite de pittori, scultori et architetti moderni*. Rome: Success. al Mascardi. (available from www.books.google.it).

Berenson, B. 1954: *The Arch of Constantine*. London: Chapman and Hall.

Bezold, W. 1874: *Die Farbenlehre im Hinblick auf Kunst und Kunstgewerbe*. Brunswick: G. Westermann. https://www.digitale-sammlungen.de/de/view/bsb11187496

Blanc, C. 1870: *Grammaire des arts du dessin*. Paris: Librairie Renouard.

Buci-Glucksmann, C. 2008: *Philosophie de l'ornement. D'Orient en Occident*. Paris: Editions Galilée.

Chevreul, M.-E. 1839: *De la loi du contraste simultané des couleurs et de l'assortiment des objets colorés*. Paris: Pitois-Levrault. https://archive.org/details/delaloiducontras00chev

Dalton, J. 1798: 'Extraordinary Facts relating to the Vision of Colours: with Observations', *Memoirs of the Literary and Philosophical Society of Manchester* 5: 28-45. https://digital.sciencehistory.org/works/fb4949523

Davies, W. V. (ed.) 2001: *Colour and Painting in Ancient Egypt*. London: The British Museum Press.

Ehrle, F. 1899: *Fragmenta et picturae Vergiliana codicis Vaticani latine 3225* [Codices e Vaticanis selecti 1]. Rome.

Elsner, J. 2006: 'From Empirical Study to the Big Picture. Some Reflections on Riegl's Concept of Kunstwollen', *Critical Inquiry* 32: 741-766.

Elsner, J. 2021: 'Alois Riegl: Art History and the Beginning of Late Antique Studies as a Discipline', in C. Ando & M. Formisano (eds), *The New Late Antiquity*, 167-182. Heidelberg: Winter.

Goethe, J. W. 1810: *Zur Farbenlehre*, 2.vols. Tübingen: Cotta.

Gombrich, E. H. 1961: *Art and Illusion. A Study in the Psychology of Pictorial Representation*. Princeton: Princeton University Press.

Gombrich, E. H. 1984: *The Sense of Order*. London: Phaidon.

Hesslinger, V. M. & C.-C. Carbon 2016: '#TheDress: The Roler of Illumination Information and Individual Differences in the Psychophysics of Perceiving White-Blue Ambiguities', *i-Perception* March-April 2016: 1-10.

Hsia, Y. & C. H. Graham 1997: 'Color Blindness', in A. Byrne & D. R. Hilbert (eds), *Readings on Color II: The Science of Color*, 201-230. Cambridge Mass.: MIT Press.

Hunt, D. M., K. S. Dulai, J. K. Bowmaker & J. D. Mollon 1995: 'The Chemistry of John Dalton's Color Blindness', *Science* 267: 984-988.

Iversen, M. 1993: *Alois Riegl: Art History and Theory*. Cambridge Mass.: Mitt Press.

Jones, O. 1856: *The Grammar of Ornament*. London: Bernard Quaritch https://archive.org/details/grammarofornamen00joneuoft

Kemp, M. 1990: *The Science of Art. Optical Themes in Western Art from Brunelleschi to Seurat*. New Haven & London: Yale U.P.

Kiilerich, B. 2007: 'What is Ugly? Art and Taste in Late Antiquity', *Arte medievale* n.s. 6: 9-20.

Kiilerich, B. 2011: 'Optical Colour Blending in the Rotunda Mosaics at Thessaloniki', *Musiva & sectilia* 8: 163-192.

Kiilerich, B. forthcoming: 'Riegl's Concept of Late Roman Art: Judging the Evidence', in U. Hansson (ed.), *History of Classical Archaeology in the Nineteenth Century* (Conference, Swedish Institute, Rome, 4-6 April 2013). Berlin: De Gruyter.

Kurth, J. 1901: *Die Wandmosaiken von Ravenna*. Leipzig/Berlin: Deutsche Bibelgesellschaft (2nd ed. 1912: Munich: R. Pieper & co). https://archive.org/details/diemosaikenderch00kurt/

Labarte, J. 1864-66: *Histoire des arts industriels au moyen âge et à l'époque de la renaissance*. Paris: A. Morel et cie.

Linas, Ch. De 1884: 'Gourde antique en bronze émaillé', *Gazette archéologiques* 1884: 133-140. www.digi.ub.uni-heidelberg.de/diglit/gazette_archeologique1884

Livingstone, M. 2002: *Vision and Art. The Biology of Seeing*. New York: Abrams.

Lockard, J. 2016: 'Seeing Through a Roman Lens: Formalism, Photography, and the Lost Visual Rhetoric of Riegl's Late Roman Art Industry', *History of Photography* 40 (3): 301-329.

Lucas, A. 1962[4]: *Ancient Egyptian Materials and Industries* (revised by J. R. Harris). London: Edward Arnold.

Marmor, M. F. 2001: 'The Dilemma of Color Deficiency and Art', *Sur Ophthalmol* Mar-April 2001: 407-415.

Marmor, M. F. 2016: 'Vision, Eye Disease, and Art', *Eye (Lond)* Feb (2): 287-303.

Marmor, M. F. 2017: 'John Dalton: The Recognition of Color Deficiency', in M. F. Marmor & D.M. Albert (eds), *Foundations of Ophthalmology*, 23-34. Springer International.

Marmor, M. F. & J. G. Ravin 2009: *The Artist's Eyes: Vision and the History of Art*. New York: Harry Abrahms.

Mazal, O. (ed.) 1998: *Dioscorides Pedanus. Der Wiener Dioskurides: Codex Medicus Graecus I, Der Österreichischen Nationalbibliothek*, 2. Vols. Graz: Akademische Druck- und Verlagsanstalt.

Niccolini, F. 1862: *Le case ed i monumenti di Pompei disegnati e descritti* (Bd2). Naples www.digi.ub.uni-heidelberg./de/diglit/nicolini1862bd2/

Olin, M. 1992: *Forms of Representation in Alois Riegl's Theory of Art*. University Park: Pennsylvania State University Press.

Oliveira, C. M. S. 2013: 'Aloïs Riegl, o Barroco e o conceito de Kunstwollen: algumas consideracões em História da Arte', *Sæculum – Revista de História* 28: 13-27.

Pächt, O. 1977: 'Alois Riegl', in Idem, *Methodisches zur kunsthistorischen Praxis*, 141-152. Munich: Prestel (first published in *The Burlington Magazine* 105, 1963, 188-193).

Reichenberger, A. 2003: *Riegl's "Kunstwollen". Versuch einer Neubetrachtung*. Munich: Sankt Augustin.

Riegl, A. 1893 (1975): *Stilfragen. Grundlegungen zu einer Geschichte der Ornamentik*. Hildesheim/New York: Georg Olms Verlag

Riegl, A. 1897/98, 1899 (1966): *Historische Grammatik der bildenden Künste*. Aus dem Nachlass herausgegeben von K. M. Swoboda & O. Pächt. Graz/Cologne: Hermann Böhlaus Nachf.

Riegl, A. 1901/1927 (2000): *Spätrömische Kunstindustrie mit einer Nachwort zur Neuasgabe von Wolfgang Kemp*. Berlin: Gebr. Mann Verlag.

Riegl, A. 1908 (1987): *Die Entstehung der Barockkunst in Rom* [Wien: 1908] Munich: Mäander Verlag.

Riegl, A. 1985: *Late Roman Art Industry*, translated and foreword by Rolf Winkes. Rome: Bretschneider.

Rood, O. N. 1879: *Modern Chromatics with Application to Art and Industry*. New York: Appleton & Co.

Runge, P. O. 1810: *Farben-Kugel*. Hamburg: Friedrich Perthes.

Sacken, E. von 1883: 'Über einige römische Metall- und Emailarbeiten', *Jahrbuch Kunsthistorische Sammlungen* 1: 41-60. digi.ub.uni-heidelberg.de/diglit/jbksak1883/

Simunovic, M. P. 2010: 'Colour Vision Deficiency', *Eye* 24: 747-755.

Simunovic, M. P. 2016: 'Acquired Color Vision Deficiency', *Survey of Ophthalmology* 61: 132-155.

Spikic, M. 2010: 'A Portrait of Riegl in Split', in P. Noever, A. Rosenauer & G. Vasold (eds), *Alois Riegl Revisited*, 137-139. Vienna: MAK.

Wolf, E. & H. Scheibner 1982: 'On the Relationship between Protanomaly and Protanopia', *Documenta Ophthalmologica*, *Proceedings series* 33: 321-326.

Woltmann, A. & K. Woermann 1879: *Geschichte der Malerei I-III. Die italienische malerei des 17. Jahrhunderts*, Leipzig https://digi.ub.uni-heidelberg.de/diglit

Woodfield, R. (ed.) 2001: *Framing Formalism: Riegl's Work*. Amsterdam: G+B Arts.

Wright, D. H. 1991: 'From Copy to Facsimile: a Millenium of Study of the Vatican Vergil', *The British Library Journal* 17 (1): 12-35.

Wright, D. H. 1993: *The Vatican Vergil. A Masterpiece of Late Antique Art*. Berkeley: University of California Press.