

# THE AMBIGUITIES OF COLOUR: WITTGENSTEIN AND LICHTENBERG ON THE PHILOSOPHY OF COLOUR

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Ludwig Wittgenstein (1889-1951) nourished a life-long interest in colour. His most systematic treatment of the topic is included in the posthumous work *Remarks on Colour*, in fact a series of notes that he started writing around the New Year of 1949/50 as he was visiting his family in Vienna.

His *Remarks* are usually associated with Goethe's *Farbenlehre*, or Theory of Colour. Wittgenstein's interest in Goethe was, in this case, above all due to the fact that the *Farbenlehre* resembled his own enterprise in one specific respect: it was an attempt to treat colours from some other perspective than that of Newtonian physics. But one can also say that Goethe's most important contribution to Wittgenstein's thought on this score was not specifically *Goethe's* at all. What above all captured Wittgenstein's interest were two letters that Goethe received from others. One was from the painter *Philipp Otto Runge* (included in the *Farbenlehre*) and the other – the actual point of departure for Wittgenstein's own reflections – came from *Georg Christoph Lichtenberg* and was subsequently published.

Lichtenberg was in his lifetime (1742–1799) renowned as a physicist. Later generations remember him above all as the writer of journals and aphorisms, works of an acute mind that had considerable influence on subsequent German style. Wittgenstein, too, was helped in his thinking by these remarks written down a century and a half earlier.

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Those who study colours theoretically must first of all realise that there is room for questions of principle about colour that *cannot* be answered with the help of mere physical or physiological investigations of light, reflecting surfaces, the neural system etc. In philosophy, if we ask ourselves what colour is, the question we are really asking is: what is the *concept* of colour? In other words, what is meant by colour? What do we mean, for instance, when we speak of two objects being the same colour, or when we speak of lighter and darker colours?

Note that we cannot leave this *conceptual* investigation aside and simply proceed to science proper for empirical results. If a scientist says he or she has an empirical solution to the question of what colour is, we will need to see *what* question it is the scientist has actually answered. We will need to investigate whether what the scientist *calls* 'colour' is the same thing as what we would call 'colour' in our everyday lives. If that is not the case, the scientist's results will not be falsified. However, those results will then apply only to some cases but not to others. Other questions will remain.

One of Wittgenstein's central philosophical insights is exactly his realisation that the analysis of what a concept means involves a description of its role, of how the concept is used. An analysis of colour concepts must, among other things, pay attention to our ways of distinguishing between colours, as well as looking at the circumstances in which we would say, on the contrary, that two colours are the same.

Alas – here, as very often in philosophy, the fish will be the last to understand that they live in water. The ambiguities of colour escape us in spite of their familiarity – or perhaps just because of it.

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Wittgenstein's original interest in colour arose from the fact that he studied logic. Colours, too, have a kind of logic, an order that strangely enough gives the impression of logical necessity *and* natural necessity at once (See TLP 6.3751; cf Some Remarks on Logical Form). Art teachers and colour scientists frequently illustrate this logic in graphical renderings such as colour circles or colour solids (Wittgenstein's manuscript *Philosophical Remarks* of 1930 includes his own version). The colour circle demonstrates 'necessary' relations between colours; for instance, it shows that green lies between blue and yellow, and that green and red as well as blue and orange are complementary colours.

Runge writes in his letter (reproduced in Goethe's *Farbenlehre* and in turn commented by Wittgenstein in his *Remarks on Colour*) that it will be impossible to imagine reddish green. Indeed, the expression 'reddish green' gives us the same feeling as hearing someone talk about a southwesterly north wind. This as opposed to, say, *bluish* green. You can demonstrate the same point with the help of the colour circle. The colour circle allows for a direct passage from green to blue, while you must go through another colour in order to get from green to red. Every sector that might include the colour 'reddish green' is as it were already taken up by something else, by brown for instance.

Runge also notes another necessity that cannot be adequately demonstrated by means of the colour circle. There can be transparent blue but no transparent white. If 'white wine' was properly white it would look like milk.

These statements about colours resemble geometrical and mathematical propositions in the sense that they are not just statements about specific individual objects. They deal with colours as such in the same way as geometry deals with extended bodies as such, not with individual triangles and cubes. They are 'timeless' (I.1). Wittgenstein speaks of *colour geometry*. It describes so to speak the behaviour of ideal colours in ideal space.

And Wittgenstein wonders what kinds necessity are involved. Does colour geometry deal with how we speak of colours and think of them, or does it express some facts of nature of some kind? Could there be an alternative colour geometry that allows for reddish green? (Cf I.9). These questions have a central place in Jonathan Westphal's *Colour: A Philosophical Introduction*, a work that uses Wittgenstein's Remarks as its starting point.

On the other hand – perhaps there is reddish green? Could an olive be called reddish green? Wittgenstein doesn't give a conclusive answer. The interesting question is not whether to answer Yes or No, but rather the question *when* one might be inclined to say the one thing or the other. It seems to me that at least one point can be made here: we *might* call certain ('brownish') hues 'reddish green'. In that case we would typically be thinking of vegetable products (olives, autumn leaves, etc) but definitely *not* of some sector in the colour circle.

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Contrasts between colour geometry and the natural perception of colour in fact constitute a main theme in the Remarks on Colour (as stressed by the philosopher and Wittgenstein scholar Marie McGinn). Natural perception of colour involves ambiguities that colour geometry does not account for. For instance: is white in bad light the same as grey in good light? Both 'yes' and 'no' might be correct in the right circumstances. The point can be generalised. Wittgenstein speaks of the indeterminateness of our concept of *sameness of colour* (I.56; cf I.59, I.49).

Lichtenberg's letter of October 1793 to Goethe seems to have given Wittgenstein a crucial impulse. The correspondence deals with the effect of illumination on colours, including white. Lichtenberg suggests that Goethe should examine what it is we *call* white. In other words he proposes what in the beginning of this essay was called a conceptual investigation, as opposed to Goethe's physiological and psychological approaches.

Lichtenberg suggests a definition of 'white'. White is absolutely, optically white, perhaps the colour of the snow one would see on the highest peak of the Alps in sunshine. Very few people have actually *seen* it. The 'white' we usually see is impure – but we *call* it white. We recognise the colour we call white in all kinds of illumination:

For instance, I consider this sheet of paper to be white, in the deepest darkness, even at night in the weakest of starlight, in tallow- wax- and lamplight, in bright sunshine, at the sunset, in snow and rain, in the forest and in the wall-papered room [...].

Lichtenberg formulates an early version of the theory of colour constancy – in other words, of the assumption that we unconsciously *adjust* our colour perception:

We don't, of course, notice this, because in all judgments based on visual perception, [the elements of] judgment and perception are completely amalgamated, so that later in life it is impossible for us to distinguish them; we believe at each moment that we *see* what is really just an *inference*.<sup>1</sup>

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<sup>1</sup> Lichtenberg 1992. Brief 2303, Oktober 1793. p. 162-163. The entire German text runs as follows: "Ich halte diesen Bogen Papier z.B. für weiß, in der tiefsten Dämmerung, selbst in der Nacht bey dem schwächsten Sternenlicht, bey Talg= Wachs= und Lampenlicht, im höchsten Sonnenschein, in der Abendröthe, bey Schnee und Regenwetter, im Walde und im tapezierten Zimmer [... ] Wir mercken dieses freylich nicht, weil in allen unsern Urtheilen die sich auf Gesichts Empfindungen gründen, Urtheil und Empfindung so zusammenwachsen, daß es uns in gewissen Jahren kaum möglich ist sie wieder zu trennen; wir glauben jeden Augenblick etwas zu empfinden was wir eigentlich bloß schließen. Daher rührt es, daß die schlechten Porträtmahler die Gesichter ganz über und über mit Fleischfarbe anstreichen; sie können sich gar nicht vorstellen, daß in einem Menschen=Gesicht blaue grüne gelbe und braune Schatten seyn können, und bey ihrem Manschetten=Werk verfahren sie so sauberlich, daß man nur aus dem Ort und dem Umriß erräth, daß der Kalchfleck, den sie hingeklebt haben, eine Manschette vorstellen soll. Meinem Fenster gegenüber steht ein weißer Schornstein, dessen beyden mir sichtbaren Seiten // selten einerley Grad von Erleuchtung haben. Zuweilen wenn mir die eine Seite Gelb oder bläulich zu seyn scheint, frage ich Personen von übrigens sehr richtigem Verstand um die Farben des Schornsteins. Gewöhnlich ist die Antwort, er ist so weiß auf der einen Seite als auf der andern, auf die eine scheint aber die Sonne, das macht den Unterschied. [...]"

In the scientific language of today one might speak of a difference between sensation (sense data) and cognition. According to the theory of colour constancy, our colour sensations are adjusted by an unconscious cognitive mechanism that creates the final perception of colour.

The phenomena known as colour constancy may, for many useful purposes, be said to consist of two separate kinds of phenomena; these may be called *illumination constancy* and *the recognition of colour* (Lopes). Illumination constancy means the physiological adjustment of the visual system to prevailing lighting conditions. The eye adjusts itself to the *overall* illumination indoors and out of doors, in the morning, at noon and in the evening. The recognition of colour, on the contrary, has to do with *local* variations within the parameters of given lighting conditions. Human beings are able to distinguish between, on the one hand, genuine differences of colour and, on the other hand, contrasts caused by shadows and reflections. While illumination constancy involves physiological adjustments, our ability to distinguish between a stain and a shadow is *not* produced by specific physiological changes. It is rather an aspect of our general ability to orient ourselves and deal with a three-dimensional environment.

When Lichtenberg (as quoted) writes about the effect of illumination he is speaking of illumination constancy. Further down in the letter he discusses colour recognition:

Outside my window there is a white chimney, the both visible sides of which very seldom get the same amount of light. Sometimes, when the one side looks yellow or bluish, I ask people of otherwise very good judgment [!] what colour the chimney

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daher wird auch das Colorit leichter nach den Wercken großer Meister als nach der Natur studirt, weil man dort die Farbe schon vom Urtheil geschieden auf der Leinwand hat, u[nd] sie wie jeden andern gefärbten Lappen untersuchen kan gegen allerley Licht und in allerley Neigungs Winckeln gegen dasselbe; hier aber erst Urtheil von Empfindung geschieden werden muß, das nicht jedermans Sache is

is. Usually they reply that it is just as white on the one side as on the other, only that the sun is shining on the one but not on the other.

The two sides of the chimney are optically different, but even people 'of *otherwise* very good judgment' will think that they are the same colour. This is exactly because 'judgment and sensation' are 'amalgamated' on this score. Lichtenberg seems to think that the two sides of the chimney are actually of different colours. Or perhaps he means that we ought to think so *if* we by 'colour' meant the stimulus that actually meets the eye.

The example demonstrates the ambiguous character of the expression 'the same colour'. We would probably say in most contexts – but not in all – that the two sides of the chimney are of the same colour despite the fact that they look different in the sunshine. – And do they, then, *look* different? Yes they do, in a sense: for instance, they would be represented by different colours in a colour 'photo. In another sense, they don't. For instance, we would not be made to *believe* that the chimney is *not* white on both sides. It looks exactly the way that a white chimney *should* look – given the lighting conditions. (On the other hand our judgment of the illumination is in itself influenced by our belief that the two visible sides of the chimney are of the same colour.) Our ability to make these judgments shows something crucial about colour: it demonstrates that we do not, in a natural context, judge the colours of objects by seeing whether they match a timeless model such as Lichtenberg's ideal white. Rather we judge the object in a context of illumination and shadows.

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The context-dependent (or 'ecological') character of colour is shown nicely in the context of a phenomenon that furnished the actual reason why Lichtenberg wrote to Goethe. He was commenting on an essay on *coloured shadows* that Goethe had sent him.

The first scientific experiments on coloured shadows were reported by Otto von Guericke [ge:rike] (1602–1686), physician and the burgomaster of Magdeburg. An excellent modern description of the phenomenon is included in Scientific American 1986 (Brou et al.).

In fact it is not difficult to find instances of coloured shadows in your surroundings once you know where to look for them. But you can also produce coloured shadows at home, quite industrially if you like. The main principle is that two light sources of different colours should illuminate the same area; for instance a candle (orange) and sunlight (neutral) indoors on a rainy day. (If you want variation you can substitute other lights of the colours of your choice). Place the candle close to a white wall that receives indirect sunlight from the window. Place your hand between the candle and the wall and project a shadow. Now place another hand *on the other side of* the candle to cast another shadow. The two shadows should now be differently coloured. On areas where candlelight is blocked but natural light is *not* the shadow will be blue. Where natural light is blocked but candlelight is not, the shadow will be orange (or perhaps rather brown). Where both lights are blocked the resulting shadow is black.

Scientists have disagreed about whether the coloured shadow should really be called coloured; some would call the colour an illusion. This is because the blue shadow represents a physical stimulus (a spectral power distribution of electromagnetic radiation) that would be perceived as *grey* if the surrounding illumination was neutral. The orange environment, however, makes us expect an orangey nuance of grey. *In relation to* the surrounding areas, the shadow has an under-representation of orange. The under-representation of orange is the same as an over-representation of its complementary, or blue. In other words, the shadow is blue because it is *less orange than* (hence more bluish than) grey should *appear* in the overall illumination.



The question whether the shadow is *really* coloured is a typical conceptual question. It is not settled by collecting more data; rather one will need an investigation of the concept of 'real colour'. With concrete objects one may make a distinction between their real and apparent colours. The reason is no doubt the fact that you can study a concrete object in *various* kinds of illumination. A blue object in orange light looks in fact the same colour as the blue shadow in the candle experiment. They would have the same colour in a 'photo'. However, you can move the blue object outdoors and study its real colour. You cannot move the shadow.

This motivates the conclusion that a coloured shadow simply has the colour it looks like having. However, in discussions of coloured shadows it is frequently stated that the colour is an illusion, physiologically produced and comparable to after-images (Westphal, Brou et al). The idea that the shadow is not really blue but rather grey (while the blue object next to it really is blue) seems to stem from the contention that the same physical stimulus, the same spectral power distribution of light, *must* always result in the same visible colour. However, as we have already seen, colour constancy means that such a principle cannot be upheld in other contexts.

There will be a simple answer to the question whether the shadow is really blue if we accept that the description 'blue' means the same thing both for shadows, lights, and objects. 'Blue', I suggest, means *the over-representation of blue* or, in other words, the under-representation of orange in the given milieu. ('Blue' is then like 'big'. 'Big' means comparative, not absolute size.)

In this way, coloured shadows turn out to be a special case of the general phenomenon of colour constancy (Brou et al.). Or rather, *both* are illustrations of the same general point: namely, that the colours of one's surroundings (like the sizes of objects) are judged by means of comparisons. The colour of a given spot can never be identified conclusively if one just studies the coloured spot in isolation. (This is a conclusion also suggested by Brou

et al.). Colours are rather identified in relation to the overall 'colour situation' in one's surroundings.

A coloured object darkens the incident light by absorbing parts of it. The absorbed parts of the spectrum correspond to the complementary of the colour that the object has. To see the colour of an object is, from this point of view, to see the under-representation of its complementary in the light reflected by the object. To express it in a schematic way, 'blue' means 'bluer than ...' (or perhaps rather 'less orange than ...') just as 'dark' means 'darker than...' and 'big ' means 'bigger than ...'. And the point of comparison consists of the visible, coloured surroundings with its lights and shadows.

A colour chart is, in this perspective, *not* a context-free representation of colours. It rather represents an attempt as far as possible to *control* the context within which colours are seen and compared. The surroundings are 'neutral' and the charts are supposed to be studied in 'normal' illumination. But here the very definitions of normality and neutrality are based on practical and conventional considerations. When colour scientists register correlations between perceived colour and wavelength (spectral power distribution of light) they are dealing with colours in specific, standardised conditions rather than with colour in general. (For a description of standardisation methods see Rydefalk & Wedin.)

These conditions are not 'normal' if, by that word, we mean what is usual, typical or common. The experimental setup is in fact *not supposed to* approximate the conditions that obtain for colour vision in most natural settings – even less, to constitute a model for all possible cases of colour perception. The point is to create controlled, reproducible conditions for comparisons between colour samples – not to work towards a general answer to the questions, "What is colour?" or, "What is *the* relation between colours and physics?"

This should give pause to those philosophers (and some colour scientists) who would treat the experimental results as blueprints for future reductionist accounts of colour. While law-like connections between physical stimuli and perceived colour can be established in conditions especially designed for the purpose, questions remain about what we can say about the status of colour judgments *outside* those conditions. Rather than privileging cases of just one type, philosophers need to *examine* their relation to other cases.

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Going back to Wittgenstein's remarks.

Wittgenstein highlights the contrast between colour geometry, where colours are treated as independent of each other, and normal colour perception where the colours of individual spots are defined in relation to the whole of one's surroundings. In this context, Wittgenstein considers the question of how the colours of a natural visual scene are reproduced in paintings. A discussion of painting illustrates the contrasts between the two ways of identifying colours and talking about them.

Ideally speaking, in colour geometry, it is true that white is the lightest colour. On a flat surface in homogeneous illumination – as in the French Tricolour – white will be the lightest part of the surface. But it does not follow that white objects are always the lightest parts of *a picture*. Wittgenstein imagines a painting where a white sheet of paper receives its illumination from a blue sky. The sky will have to be painted lighter than the piece of paper.

The painted canvas can be called an *interface*, a point of transition from colour geometry to the natural perception of colour. An artist's palette represents colour geometry in an almost pure form. Colours are placed there, in good order against a neutral, flat surface. But when the artist dips his brush in paint and places a speck of colour in the right place

the effect will depend on *where* on the canvas the pigment is placed. What in colour geometry is defined as *grey* will perhaps become a white area placed in a shadow, blue placed in orange light, or a highlight on a polished grand piano. The question what colour *this spot in the painting* is, will be ambiguous. One can either think of the pigment placed on the piece of painted fabric (grey) or of the colour of the object depicted in the painting (white, blue, black, etc).

The eye in a Rembrandt picture shines like real human eyes do. The illusions of transparency and shine are created by means of light specks of colour. But they become shine only in some surroundings. Not if someone were to try and paint his room 'the same colour as' the Rembrandt eye.

Wittgenstein also remarks that Rembrandt did not use gold paint in his *Man with a golden helmet*. (This famous painting in Dresden was then attributed to Rembrandt and said to be a portrait of Rembrandt's brother. Later studies have identified the real painter as one of his students.) The painter has created the impression of gold by means of a combination of various brown, black, and yellow pigments. In this journey from the palette to the canvas, yellow – or brown or black! – turns to gold.

Wittgenstein's interest in the transition from the palette to the canvas may, too, have been stimulated by his reading of Lichtenberg.

Lichtenberg writes, as we have seen, about the difficulty of distinguishing between 'judgment' and 'sensation' in colour judgments. He continues, immediately after the passage already quoted:

[I]n all judgments based on visual perception, [the elements of] judgment and perception are completely amalgamated, so that later in life it is impossible for us to distinguish them; we believe at each moment that we *see* what is really

just an *inference*. This is the reason why bad portrait painters smear the faces all over with flesh colour. They can't imagine that a human face may have blue, green, yellow, and brown shadows. And the cuffs are painted in such a spotless manner that only their placement and outline betrays that the stain of chalk that the artist has thrown there is meant to be a cuff.

Lichtenberg now proceeds to the remark about the white chimney quoted earlier. The homogeneity or *sameness* of two samples of white in "judgment" is contrasted with the *difference* of "perception" when we see the two samples without preconceived notions. The successful painter must abstract away from his or her "judgment" and just try to see a visual pattern. – Hence, Lichtenberg says:

[F]or the same reason, the technique of colouring is studied more easily from the works of great masters rather than from nature, because the colour is already there on the canvas, divorced from judgment, and it can be studied like any other piece of coloured fabric, in all kinds of light and in all kinds of angles against it. But here judgment must first be divorced from perception, which not everyone can do.

Wittgenstein's remark in I. 60 of the *Remarks* might be directly inspired by Lichtenberg's discussion.<sup>2</sup> He imagines that we actually cut up a painting in pieces and use the pieces as a pointillist jigsaw puzzle. The placement of a given fragment will decide whether it will be seen as part of a grey object, or as a piece of a white object in shadow, or as a highlight, or still something else.

Here the discussion is connected to a well-known issue within the philosophy of perception. Someone might think of the jigsaw puzzle as an analogy of how a visual scene

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<sup>2</sup>Also see the previous entry (I. 59), where Wittgenstein speaks of painting the view from his window.

is actually, *in the last analysis*, mediated to the perceiving subject. We can try to think of our visual field as consisting of a large number of tiny spots, each with a specific colour. The background of this thought experiment lies in the Phenomenalist project which constitutes an important motif in the empiricist tradition. The idea is that our visual sensations really consist of exactly this – coloured spots; then we (or rather our brains) interpret our sensations as indicating an array of objects in three-dimensional space. A strict description of our visual sensations would simply give us the colours of the individual spots but not impose a description of objects on them (cf I.61).

Wittgenstein of course deeply disagrees with the Phenomenalist project. If the colours of objects cannot be identified independently of the surroundings, then the same thing should apply to the coloured bits of mosaic. Even if one were to look at each of them in isolation from the others, the bits would be seen in *some* surroundings (see III.108). The idea of a visual mosaic required, however, that the colour of each piece should be identified regardless of everything else around it. But exactly this is impossible. For this reason (too), Phenomenalism cannot give us a coherent theory of visual perception.

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*Remarks on Colour* was not published in a shape that its author would have approved of. Much of the writing is unorganised and fragmentary – simply because the manuscript was never finished. I have concentrated on one or two important themes in it. In spite of its shortcomings the work is much in line with Wittgenstein's philosophy in general. One can recognise his striving never to look at a phenomenon in isolation. A colour 'shines' *in its surroundings*, just as eyes only smile in a face (see I.55).

Such holistic emphasis represents a permanent tendency in Wittgenstein's work. It cannot, for instance, simply be traced to the influence of Lichtenberg. At the same time

Lichtenberg seems to have struck a philosophical chord that found resonance in Wittgenstein.

In conclusion, this discussion suggests that our colour judgments *never* simply concern isolated patches of colour, regardless of the surroundings. This is in fact not news to experimental colour research. There, the context dependence of colour constitutes a central research topic, with a range of applications in graphic, electronic, textile and other industries. In that research, the trick is not magically to make the surroundings vanish but to establish conditions where they are known and fixed. Thus the context relativity of colour judgments lies at the centre of colour science. It remains for philosophers to recognise its implications to the *concept* of colour.<sup>3</sup>

#### *Literature*

Brou, Philippe, Sciascia, Thomas R., Linden, Lynette & Lettvin, Jerome T. (1986): The Colors of Things. *Scientific American* 255:3, 80-87.

Goethe, Johann Wolfgang von (1989): Zur Farbenlehre. *Sämtliche Werke* Bd 10. Carl Hauser Verlag, München.

Lichtenberg, Georg Christoph (1992): *Briefwechsel*. Band IV. C.H. Beck, München.

Lopes, Dominic M. McIver (1999): Pictorial Color: Aesthetics and Cognitive Science. *Philosophical Psychology*, Vol 12, No. 4, 415-428.

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McGinn, Marie (1991): Wittgenstein's *Remarks on Colour*. *Philosophy* 66 (1991), 435-453.

Rydefalk, S. & Wedin, M. (1997): *Literature Review on the Colour Gamut in the Printing Process*. PFT-rapport nr 32. Forskningsområde–Tryckkvalitet. STFI, Stockholm.

Westphal, Jonathan (1991): *Colour. A Philosophical Introduction*. Second edition. Basil Blackwell, Oxford.

Wittgenstein, Ludwig (1978): *Remarks on Colour*. University of California Press, Berkeley and Los Angeles.

--- (1992): *Tractatus Logico-Philosophicus*. Översatt av Anders Wedberg. Thales, Stockholm.

--- (1975): *Philosophical Remarks/ Philosophische Bemerkungen*. Blackwell, Oxford.

--- (1993): Some Remarks on Logical Form. In Ludwig Wittgenstein, *Philosophical Occasions 1912-1951*, s 29-35. Hackett, Indianapolis.