

**Looking at Colour:**

**A Philosophical Exposition**

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## Abstract

This dissertation consists of two parts. Part I examines three historical attempts at explaining colour on the basis of Goethe's *Farbenlehre*. Schopenhauer, Hegel and Wittgenstein each give successful explanations of some but not all colour phenomena. As they succeed and fail in the same areas in which more recent subjectivist and objectivist accounts succeed and fail it must be concluded that the nature of colour does not allow for reduction to subjective states of mind or to objective physical processes.

Part II examines colour itself: The first three chapters establish internal colour relations. Colour language and colour blindness re-introduce the human subject whose importance is most evident in the contemplation of paintings. As paintings cannot only represent three dimensional objects but can also evoke feelings through mere colour effects, colour is an important medium for the communication of subjectivity and ideality.

The conclusion is twofold. First, we have to strictly differentiate between the ontology and the epistemology of colour: Colour exists objectively and hence independently of observers, but internal colour relations are nevertheless determined by human thought. Secondly, colour is irreducible: although science can explain most of its aspects the nature of colour itself can only be understood through the irreducible variety of colour effects.

## Statement

I declare that this dissertation is my own work and that it does not contain material submitted for any other degree or professional qualification.

Edinburgh, 31<sup>st</sup> October 1997

*In memory of my grandfather*

*Walter Höltnen*

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## INTRODUCTION

The physical properties of light and colour, the physiology and psychology of colour vision and its evolution, and even the structure of colour language have all been studied in great detail over the last thirty years or so. The result is a large number of theories most of which are consistent with each other, so that one might be justified in saying that we, the scientifically educated that is, know everything there is to know about colour, with the exception perhaps of a few details which will surely be known in the foreseeable future.

To write a philosophical treatise on colour may therefore seem a superfluous exercise. Yet I hope to demonstrate that a *philosophical exposition* can show colour's true colours in a way scientific theories cannot. As the pun suggests, I believe that the notion of truth regarding colour is at least partially self-referential. Hence it cannot be grasped without looking at the colours themselves. It follows that colours are irreducible to non-visible quantities, be they physical, physiological or chemical.

The aim of this thesis is to show *what* scientific theories try to explain, when they explain colours by reducing them to quantitative entities. By *looking at colour* I therefore hope to explain the object of investigation that scientific and philosophical theories have in common. Although colour is an object of investigation in this sense, it will prove to be a good example for showing that there are no pure objects. I believe that by definition there can be no object without a subject and no subject without an object. (In other words, the notion of "object" only makes sense in connection with the notion of "subject".) Thus the object is defined in two ways:

First, the object must be distinct from the subject (for otherwise it would *be* the subject); by being different from the subject as well as from other objects, each object is placed in space and time (for difference as we know it can only exist in space and time. Secondly, the object exists only in the sense in which it exists for the subject (for if it was not known to the subject it would be an object without a subject, which contradicts its own definition).

The subject, on the other hand, is extensionless intentional consciousness; hence subjects cannot exist without objects as they would then not be conscious of anything, which is contrary to their definition. Accordingly any object is an intentional object.<sup>1</sup>

All acts of perception may be considered as fundamental connections between subject and object (a subject perceiving an object). Some kinds of perception, however, are said to be "more objective" than others. Thus the automatic taking of images by an electron microscope seems to be a more objective way of capturing the world than a hallucination is. "Objective" in this sense means something like "independence of individual perceivers and their states of mind".<sup>2</sup> Hallucinations are only seen (or "experienced") by one individual at a time and are hence highly "subjective" in the sense that they are strongly bound to that perceiving subject and would not exist without it. Since colour can be experienced in hallucinations but can also be investigated and analysed in laboratories, I shall argue that subjective as well as objective aspects are essential to the nature of colour.

This thesis consists of two parts. In the first part I introduce and discuss the ontology of colour as seen by strong subjectivists, weak subjectivists, and objectivists. As I found a little of each theory together with many useful examples in Goethe's *Farbenlehre*, I begin with a brief overview of this influential work on colour and then devote a chapter to each of the above theories as developed by Schopenhauer, Hegel and Wittgenstein respectively, all of whom refer to Goethe in their writings on colour. I also include more recent versions of these theories at the end of each chapter, and a fifth chapter on Schopenhauer's and Goethe's understanding of Platonic Ideas of colour.

While this first part of my thesis is mainly historical, the second part tries to explain various aspects of colour itself. Because I believe that colours need to be looked at to be understood, this part includes many colour illustrations. It will become apparent that each of the previously discussed theories is more useful in explaining some aspects of colour than others. It seems that this is necessarily the case: Because

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<sup>1</sup> This paragraph must be taken as a general premiss for my thesis. Each of its statements obviously requires arguments which lead far beyond the scope of this thesis.

<sup>2</sup> This applies to any definition of "mind".

colour is a natural bridge between subject and object it contains properties of both, which any purely subjective or purely objective theory will have to deny. Hence a complete account of colour will have to include both subjective and objective aspects.

Part two is divided into five chapters: In the first chapter (ch.VI) I try to establish the relationship between light and colour. Linked to the theme of light and darkness is the understanding of monochrome colours as well as of transparency and opacity. As it is possible to explain these concepts without reference to scientific measurements, I take this second chapter (ch.VII) as an opportunity to argue for a purely phenomenal account of colour as being just as helpful and complete as a scientific account (albeit for different purposes). In the following chapter (ch.VIII) a similar technique is applied to explain the notion of "primary colour". More than any other colour concept, the different definitions of the term "primary colour" show how much our colour concepts depend on purposes of use. As different purposes require different concepts, my next chapter (ch.IX) discusses the topic of colour-language. It will become apparent that the successful use of colour words does not only depend on the linguistic framework of one's community, but also on the specific visual apparatus of the individual user of the language. Various kinds of colour deficiencies necessarily prohibit the learning of certain concepts. A careful investigation of the uses of colour language thus shows how colour is both an "objective object" of perception enabling ostensive definitions, and yet qua object invariably bound to a subject.

So far, all of my results can also be explained by one or a combination of several scientific accounts. These, however, claim to be "more objective" than a "philosophical exposition" such as mine is, forgetting that they too are consciously chosen by one or several subjects. Furthermore, any scientific account rests on premisses which philosophers cannot question unless they are also trained scientists. To support my belief that an account such as mine (even if it should prove wrong or misleading in some areas) is more helpful for the understanding of colour phenomena than any scientific account is, I add one more chapter on the role of colour in painting (ch.X). I shall argue that the possibility of abstract art provides a strong argument for the inadequacy of any reductionist account of colour. If there is this one aspect of life which is irreducible to "purely objective" entities, such as atoms and light-waves, similar accounts might be extended to other aspects of human existence in order to

prove that identity theories are insufficient as philosophical explanations. Although I cannot claim to arrive at a conclusion as strong as this, my thesis can perhaps serve as an important part in a larger argument.

This raises the question of what such an argument would try to achieve. Given that most philosophers cannot question scientific results because they are not scientifically trained, any fruitful discussion between scientists and philosophers has to be based on a common set of concepts. Thus philosophers including myself should avoid the Goethean fallacy of trying to prove Newtonians wrong. Newton has not been proven wrong by Goethe, but nor has he been proven wrong by Einstein. What has happened instead is that the universal applicability of Newton's theories has been put into question. And just as Einstein showed that Newtonian mechanics only applies within a limited (idealised) context, Goethe and his followers showed that Newton's theory of colour only applies in a very limited context ("under laboratory conditions").

If someone asked me, what Goethe, Schopenhauer, Hegel and Wittgenstein had in common with Newton, I could say that they all wrote about colour. In this thesis I try to show what it is that they all wrote about. So if someone asked me what my own research had in common with the research carried out by physicists, physiologists, or other scientists, I would again say that we all investigated the nature of colour. The main difference between me and most philosophers and scientists is that I try to find nothing but general truths about colour while most of the others investigate colour within a given framework.<sup>34</sup> Thus the general tendency of my thesis is first to look and then to theorise, rather than first to adopt a theory and then to see whether colours can be explained by this theory. Thus I hope to look at colours with as little prejudice as possible in order to establish general rules about colour, and only *then* to ask which of the current or past theories is most successful at explaining these rules.

One might compare my thesis to a general introduction to taxonomy: It attempts to classify colours (into primary and secondary colours for instance), to establish basic colour relations and wherever applicable their hierarchies, to find habitats for certain colour concepts and to establish what the necessary features of each colour are. Basic taxonomical systems can be explained with reference to evolution or to anatomy, but

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<sup>3</sup> It is of course questionable whether it is possible to investigate a topic without any framework at all. My own enquiry for instance is based on the supposition that I can more or less trust my eyes.

also with historical references to Western European thinking in the 18th and 19th century, or even with reference to universal features of human conceptualisation. Similarly, the truths of the colour relations which are expressed in part II of this thesis can be justified in many ways. Most of these ways of justification or causal explanation do not compete with each other, as each has its own method. And just as a physical explanation cannot replace a linguistic or a physiological one, so too Hegel's system cannot replace or be undermined by Wittgenstein's language games; nor can Goethe prove Newton wrong or vice versa.

This thesis is a philosophical exposition of colour in that it tries to show as many facets of colour as is possible in a limited space, but at the same time ordering these facets in such a way that they make sense to people in various contexts. The order of colour qualities as represented in colour spaces is, I believe, intrinsic to the nature of colour and in this sense necessary to our understanding of colour. Whether the nature of colour and thus the necessary relations which are essential to colour are purely conceptual or whether the nature of colour is ultimately determined by perceiver-independent features I am not quite sure about. Perhaps I am not philosophically mature enough to decide for one philosophical system over another. Although my conclusion gives Wittgenstein preference over Hegel, this leaves me uneasy and unfulfilled. I would rather, my thesis was read as an exposition which could be used as the starting point to fresh debates about the nature of colour, rather than as the closing point to any such discussion. For most philosophical systems are compatible with my results, even if many of them would require some modifications or at least shifts of emphasis. I do not think that this is a weakness of my account of colour. Perhaps our colourful world can only be grasped in the colourful multitude of differing philosophical theories. The need for a new philosophy of colour is thus not the need for yet another theory of colour but the need for philosophers to abandon "perfect" theories in order to make room for living phenomena.

“Das Höchste wäre zu begreifen, daß alles Faktische schon Theorie ist. Die Bläue des Himmels offenbart uns das Grundgesetz der Chromatik. Man suche nur nichts hinter den Phänomenen: sie selbst sind die Lehre.”<sup>5</sup>

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<sup>5</sup> “It would be the highest [achievement]: to grasp that all fact is already theory. The blueness of the sky reveals to us the fundamental law of chromatics. One really should not search for anything beyond the phenomena: they themselves instruct us.” (lit. “they themselves are the Lehre” - see appendix for the use of “Lehre”.) (Goethe, M&R 488, HA12, p.432)

## GOETHE'S FARBENLEHRE IN 1997

Goethe was the first person writing about colour who divided colour phenomena into three groups depending on the degree of subjectivity involved in their perception. His *Farbenlehre*<sup>1</sup> is arguably the most influential treatise on colour ever written, even if no important philosopher, scientist or artist completely agrees with it as a whole.

Johann Wolfgang von Goethe is not usually considered a philosopher. Even those critics who regard Goethe's writings as deeply thoughtful, wise and moral, call him a "Thinker" rather than a "Philosopher". This is due to his lack of philosophical rigour and argument on the one hand, and to Goethe's own statements about philosophy on the other. For Goethe distrusted philosophical systems. He frequently mocked philosophers for first narrowing their ideas into strict lines of thought and then being forced to follow these lines to untenable extremes. That I still want to explain Goethe's philosophy systematically may be against Goethe's wishes. Yet I see no other way of making his *Farbenlehre* accessible to philosophers, and that again is in Goethe's interest who had hoped his work would be continued. Altogether I share Gadamer's view (1967) that Goethe is philosophically and not merely poetically interesting.<sup>2</sup>

Altogether Goethe considered himself to be more of a scientist than a philosopher. This is ironic when one considers the influence he still has on

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<sup>1</sup> Throughout this thesis I refer to Goethe's thoughts as his *Farbenlehre*. I use neither quotation marks nor italics as I do not mean his complete *Zur Farbenlehre* nor merely its didactic part (most commonly referred to as "Goethe's *Farbenlehre*"), but rather Goethe's thoughts on colour as a whole. These are as much expressed in his poetry and prose as in his scientific writings, and of these scientific writings the thoughts about the "Urplant" in particular are just as relevant as many paragraphs of *Zur Farbenlehre* as published in 1810. (Please see also appendix for an explanation of the meaning of the word "Farbenlehre", and my chapter on Wittgenstein for the importance of Goethe's method as a "Lehre". - see ch.IV, 3.4).

<sup>2</sup> Goethe's philosophical essays are collected in Heymacher (1905). Vorländer (1898) offers a detailed comparison between Goethe and Kant, but the philosopher mainly associated with Goethe is Spinoza. Gebhardt (1929) claims that Goethe was "Spinozean" before he even read Spinoza, and Bollacher (1969) too argues that Goethe came to Spinozean results independently from reading his work; see also Dilthey (1914), Franz (1932) and of course Goethe himself ("Studie nach Spinoza", HA13 pp.7-10).

philosophers compared to his influence on contemporary scientists. Even if Goethe initiated much research in his own time he will hardly be considered a scientist on the same level as Newton or even some less famous scientists. For it is not unproblematic to treat Goethe as a scientist. As Wittgestein shows, Goethe's *Farbenlehre* might more fruitfully be understood and used if one clearly separates between his approach as philosophical and Newton's as scientific (see also pp.98-9). I too believe that Goethe was wrong in assuming to have proven Newton's theory to be false. What Goethe offers is an alternative way of looking at colour as such, and as a philosopher I myself prefer his way of looking at colour. But as I said in my introduction, this does not mean that I wish to ignore scientific methods or results, but rather that I do not think them to be useful to philosophers. Those contemporary scientists and philosophers of science who believe that we will soon look back at Goethe's methodology with renewed interest do not, I believe, think that they can prove Newton wrong either. Rather, they hope for a paradigm shift within science to a more human (subject) orientated science following Goethe's example.<sup>3</sup>

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<sup>3</sup> The evaluations of Goethe as scientist range from Brewster (1840), who thought that the *Farbenlehre* was worthless, to Burwick (1987) who claims that the renowned scientists Purkunjé (whom Goethe met in Prague), Hering, Müller and Land are all Goethean scientists. Wells (1968) defends quantitative science against Goethe and counters some of Goethe's experiments, and Nisbet (1972) denies the originality of Goethe's work, but many critics - though sceptical of some parts - find scientifically significant facts in the *Farbenlehre* (Abraham (1983), Böhme (1987), Tyndall (1880), Young (1840), Wilhelmi (1988)). Other writers simply do not treat Goethe as a scientist but as a humanist (Arnold (1989), Wohlbold (1927)), or as a discoverer of the whole of nature (Bluntschli (1951), Madelung (1951), Walther (1930)). Heisenberg (1941, 1967) and von Weizsäcker (1957) rebuke Goethe's method but praise the moral value of the *Farbenlehre*; and finally there is a group of thinkers who regret the narrow boundaries of modern science and see Goethe as a forerunner of a better science which does not rest on the "false ontological distinctions" between science and the humanities (Hegge, 1987); see also Altner (1987), Barnouw (1987), Benn (1949), Carus (1930), Sepper (1987), Speiser (1951) and Zajonc (1987).

## 1. The Text of the *Farbenlehre*

As a truly holistic thinker Goethe's philosophy embraces the whole of living nature and it does so in all his works: in his poetry and his plays, in his fiction and his scientific writings, in recorded conversations and in letters. Goethe writes about nature and art, about beauty and ugliness, and in all of life he sees the same forces of polarity pulling us apart and keeping us alive. The *Farbenlehre* is one example of Goethe's philosophy. It explains one aspect of nature (namely colour) within the whole of nature, and in an exemplary fashion it thus includes the whole of his natural philosophy.

Goethe worked most intensely on his *Farbenlehre* from 1790 to 1810. But he had been fascinated by colour phenomena long before and continued serious work on colour up to his very last days in 1832<sup>4</sup>. The work *Zur Farbenlehre* was published on 16 May 1810 (some smaller "Contributions to Optics" had already appeared in 1791/92) consisting of three parts, a short supplement, and some forty pages of colour illustrations and explanations of his experiments. The three main parts are:

1. The "didactic" part which contains all of Goethe's experiments and observations, divided into physiological, physical, and chemical colours, as well as three shorter sections which apply the results of the first three parts to morality and aesthetics. I shall discuss this part in greater detail throughout this thesis.

2. The "polemical" part against Newton which consists of detailed discussions of Newton's *Optics*; it includes experiments which - according to Goethe - refute Newton's theory. This part is more polemical than scholarly and the cause of most of the sharp criticism of Goethe up to today. Alfred Schöne compares the work to a passionate religious argument<sup>5</sup> and I myself shall exclude it from my investigation since its most important points are repeated in the didactic and historical parts as well as in some of

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<sup>4</sup> See Eckermann, vol.2, p.278

<sup>5</sup> A.Schöne, *Goethes Farbentheologie*, 1987.

See also Wittgenstein who could be referring to Goethe, when he writes: "Wo sich wirklich zwei Prinzipien treffen, die sich nicht miteinander aussöhnen können, da erklärt jeder den Andern für einen Narren und Ketzer." - "Where two principles really do meet which cannot be reconciled with one another, then each man declares the other a fool and heretic." (On Certainty, 611)

the smaller writings. Also, Goethe himself later regretted having published this work and recommended it to be left out of future publications.<sup>6</sup>

3. The "historical" part is a collection of writings on colour from the Pre-Socratics up to Newton and then Goethe himself, all of which Goethe summarises, translates and criticises. During the "Ur-time", according to Goethe, people were amazed by colours and expressed their feelings through poetry. The same feeling of astonishment and wonder was brought into a more theoretical framework by the Greeks who thus created the first climax in the history of the *Farbenlehre*. The Greek theories were passed on through the centuries but the original amazement was slowly lost while theorization gained more and more importance. Theorisation, however, can lead to error if theories are based on false premisses which are generally accepted and therefore no longer questioned or tested. According to Goethe, Newton was one of those people who combined genius with an erroneous assumption resulting in highly intelligent but wrong theories. Goethe saw his own achievement in the return to the colours themselves, which made him notice that Newton was wrong.

The history of the *Farbenlehre* has been continued. Goethe's *Farbenlehre* as published in 1810 was supported by Hegel, Schelling and Schopenhauer during his lifetime; it later influenced Wittgenstein, Rudolf Steiner and many artists, like for instance, Runge, Turner, Klee and Kandinsky, Itten, Albers and most art teaching in schools and at universities<sup>7</sup>.

Goethe frequently told the story of how he intuitively but with absolute knowledge saw that Newton must be wrong while he was repeating one of Newton's experiments. No doubt his story has added to his critics' judgments that Goethe was a mystic rather than a scientist (and this was in no way helped by Rudolf Steiner's strong support of

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<sup>6</sup> Apparently Goethe said to Eckermann (15.05.1831) that future publications might wish to concentrate on the essential parts of the *Farbenlehre* and therefore exclude the polemic part, about which he claimed: "I certainly do not repudiate my perhaps very sharp analysis of Newton's statements - it was necessary at its time and will remain valuable in the future - but really all polemical acts are against my true nature and I take little pleasure in them. " - "Ich desavouiere meine etwas scharfe Zergliederung der Newtonischen Sätze zwar keineswegs, sie war zu ihrer Zeit notwendig und wird auch in der Folge ihren Wert behalten, allein im Grunde ist alles polemische Wirken gegen meine Natur und ich habe daran wenig Freude." (Eckermann, vol.II, p.266).

<sup>7</sup> See also Gage, 1980 and 1993.

Goethe's *Farbenlehre*). Yet I hope to show that Goethe's approach is important and leads to genuine insight.

The problem is that notions of amazement, wonder and fear, which motivated Goethe to do his experiments in the first place, are not merely less important in today's scientific world, but are in fact frowned upon as "subjective" and hence as something to be excluded from "objective" observations.<sup>8</sup> This leads to an exclusion of motivation from the experiments themselves, an exclusion frequently regretted by scientists themselves when it comes to moral issues connected to scientific research. Even apart from moral issues, however, I shall argue that it is plainly absurd to try to understand human vision while excluding the human subject. Provided that colour vision itself includes a subjective element, and that the notion of subjectivity cannot be explained by or reduced to objective concepts<sup>9</sup>, it is simply impossible to understand colour vision purely in objective terms (I shall argue for this point in more detail later on).

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<sup>8</sup> In *Culture and Value* Wittgenstein makes a similar point:

"Freilich ist es wahr, daß der *Geist*, in dem die Naturwissenschaft heute betrieben wird, mit einer solchen Furcht [vor Naturphänomenen] nicht vereinbar ist." (*Verm.Bem* (C&V), p.457)

"For the *spirit* in which the natural sciences are done today can no longer be reconciled with the fear of natural phenomena." Wittgenstein draws our attention to the fact that it is precisely the fear or wonder we feel when encountering natural phenomena such as thunder storms which wake us up and make us want to know more. And if science or philosophy want to make us more curious about the world they too should perhaps arouse fear and wonder. That this can be achieved by looking through the eyes of philosophers at the world (rather than merely at books) is one of the things the study of colour can teach.

<sup>9</sup> See S.Priest, "Newton and Hegel: Can Science Explain the Scientist?", in M.J.Petry, 1993.

## 2. Physiological, Physical, and Chemical Colours

Goethe divides colour into three major categories. This categorisation is a somewhat arbitrary one and Goethe was well aware of this (Fl.§689). The colours are ordered so that we may understand their development and their relations to each other, not so that we should label them. Many colour appearances are mentioned across chapters, and experiments from different chapters are explicitly combined to give us phenomena which are common to several categories. Not only is the difference between colour appearances a difference of degree rather than of kind, but the same Urphenomena underlie them all.

### 2.1. "Physiological Colours" & Subjectivism

"We naturally place these colours first, because they belong altogether, or in a great degree, to the subject - to the eye itself. They are the foundation of the whole doctrine..."<sup>10</sup>

"We have called them physiological because they belong to the eye in a healthy state; because we consider them as the necessary conditions of vision; the lively alternating action of which, with reference to external objects and a principle within it, is thus plainly indicated."<sup>11</sup>

Examples of physiological colours in this sense are coloured shadows, haloes and after-images. The role of the observer (the subject) is more obvious in the case of physiological colour than it is with other colour appearances. Goethe claims that the "sunlike" eye produces internal (hence subjective) colours which form the complementaries of the colours produced externally by the "real" sun, ie. the objective colours of objects in the external world.

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<sup>10</sup> Unless otherwise stated I quote from Eastlake's translation of the didactic part of Goethe's *Farbenlehre* (*Goethe's Theory of Colour*, M.I.T., 1970)

"Diese Farben, welche wir billig obenan setzen, weil sie dem Subjekt, weil sie dem Auge teils völlig, teils größtens angehören, diese Farben, welche das Fundament der ganzen Lehre machen..." (Fl.§1)

<sup>11</sup> "Wir haben sie physiologische genannt, weil sie dem gesunden Auge angehören, weil wir sie als die notwendigen Bedingungen des Sehens betrachten, auf dessen lebendiges Wechselwirken in sich selbst und nach außen sie hindeuten." (Fl.§3)

Both internal and external colours can be systemised in a colour circle. The inner physiological (subjective) colour circle is ontologically secondary to the outer natural (objective) circle and depends on it much like a mirror image depends on its object; but epistemologically the outer circle cannot be known without the inner circle just as without mirrors we do not know what we look like. (This also explains why colour blind people, who create different inner circles, cannot understand the outer colour circle seen by "normal" sighted people.) The intensity or "energy" of the inner circle too depends on the outer circle, but again the energy of external light and colours is known through complementary internal energy production.

Not surprisingly, an emphasis on physiological colours leads to a strong subjectivist view of colour. Schopenhauer, for instance, adopts Goethe's findings from this section, and claims that colours are nothing but effects on our eyes and brains. More recently this theory has been taken up by Hardin who also reduces colour to physical events within our eyes and brains. I hope to show that these strong subjectivist accounts are unsatisfactory. Yet one should remember that Goethe was the first person to draw attention to subjective colour phenomena such as after-images at all, and that by doing so he initiated much physiological research.

## 2.2. "Physical Colours" & the Synthesis of Subject and Object

"We give this designation to colours which are produced by certain material mediums: these mediums, however, have no colour themselves, and may either be transparent, semi-transparent yet transmitting light, or altogether opaque. The colours in question are thus produced in the eye through such external given causes, or are merely reflected to the eye when by whatever means they are produced without us. Although we thus ascribe to them a certain objective character, their distinctive quality still consists in their being transient, and not to be arrested."<sup>12</sup>

Physical colours are thus less perceiver dependent than physiological colours are, because additionally to light and healthy organs of vision they depend on objects

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<sup>12</sup> "Physische Farben nennen wir diejenigen, zu deren Hervorbringung gewisse materielle Mittel nötig sind, welche aber selbst keine Farbe haben und teils durchsichtig, teils trüb und durchscheinend, teils völlig undurchsichtig sein können. Dergleichen Farben werden also in unserm Auge durch solche äußere bestimmte Anlässe erzeugt oder, wenn sie schon in irgendeiner Weise außer uns erzeugt sind, in unser Auge zurückgeworfen. Ob wir nun schon hiedurch denselben eine Art von Objektivität zuschreiben, so bleibt doch das Vorübergehende, Nichtfestzuhaltende meistens ihr Kennzeichen." (Fl.§136)

external to us, namely more or less turbid media.<sup>13</sup> We can think of any visible object as a turbid medium. In the case of physical colours the medium itself is not coloured but is an essential factor for the appearance of colour.<sup>14</sup> Depending on the shape and material of the medium as well as on the direction and strength of the light, we get five kinds of physical colours: dioptric colours where the light shines through the medium; katoptric colours which are produced through reflection; paroptic colours where the light shines along the medium causing half shadows with coloured edges; eoptric colours which almost belong to the object, such as the colours of heated metal or on soap bubbles; and as a late addition to the *Farbenlehre* (added in the *Naturwissenschaftliche Hefte*, 1817) entoptic colours which appear within the medium.

It was actually Hegel who together with the scientist Thomas Seebeck drew Goethe's attention to entoptic colours and is even supposed to have named them thus. Why Hegel should be more interested in entoptic than in other colour phenomena will become apparent in my chapter on Hegel. All I want to say now is that Goethe's physical colours are a synthesis of subjective (viewer) and objective (external world) aspects. Hegel's synthesis is an ideal and in this sense subjective synthesis, but Schelling (if I understand him correctly) offers an objective synthesis.<sup>15</sup> Colours defined as a combination of subjective and objective aspects is also the explanation given by weak subjectivists, both in the Lockean tradition and by philosophers such as Colin McGinn.

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<sup>13</sup> "trübe Mittel": Goethe constantly refers to "trübe Mittel", which for want of a better phrase I shall translate as "turbid media". The adjective "trüb" and its noun "die Trübe" have also been translated as "cloudy", but the concept of cloudiness seems to evoke the image of floating particles or patches in a clearer surrounding, while Goethe's turbid media are equally turbid throughout. Prime examples are fog and coloured glass (see also appendix).

<sup>14</sup> By a "non-coloured object" Goethe means an object that is either transparent or monochrome in colour (black, white or grey). I believe that strictly speaking there is no such thing as a non-coloured visible object; yet I do think that Goethe's distinction between chromatic and monochrome colours makes sense in this context.

<sup>15</sup> Unfortunately, a detailed discussion of Schelling would go beyond the scope of this thesis, so that I shall only occasionally refer to his philosophy and instead concentrate on Hegel.

### 2.3. "Chemical Colours" & Objectivism

"We give this denomination to colours which we can produce, and more or less fix, in certain bodies; which we can render more intense, which we can again take away and communicate to other bodies, and to which, therefore, we ascribe a certain permanency: duration is their prevailing characteristic."<sup>16</sup>

Colours which truly belong to objects are "chemical colours". They are not usually referred to as colour appearances but as properties of objects. Some of Goethe's classifications in the section on physical colours are quite obscure, and Goethe's account of chemical colours is clearly wrong: he identifies the causes of chemical colours with the chemical processes and polarities between acids and alkalines. Apart from the wrong identification of underlying causes, however, Goethe is right in saying that chemical colours are the most stable and lasting of colours. Indeed, they are probably the colours which we refer to most. All paints and dyes are chemical colours.

Chemical colours are "objective" in the sense that they belong to the external world and exist independently of individual observers. They are thus the colours to which concepts such as colour constancy refer, but they are also the colours we puzzle about least (compared to rainbows and after-images we take most chemical colours for granted). As properties of objects colours can be the object of public discussion and it is these colours and their relations that Wittgenstein is interested in. Hacker and Westphal follow Wittgenstein in this.

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<sup>16</sup> "So nennen wir diejenigen, welche wir an gewissen Körpern erregen, mehr oder weniger fixieren, an ihnen steigern, von ihnen wieder wegnehmen und anderen Körpern mitteilen können, denen wir denn auch deshalb eine gewisse immanente Eigenschaft zuschreiben. Die Dauer ist meist ihr Kennzeichen." (Fl.§486)

#### 2.4. A Different Kind of Objectivism

Independently of these three categories there is also an "objectivism" of colour in the sense more commonly used in moral philosophy.<sup>17</sup> Here objectivism refers to truths or values rather than to physical objects - values and truths which are objective in the sense that they are just as independent from people as physical objects are. Goethe's *Urphenomena* can be understood in this way, and so can Schopenhauer's Platonic Ideas, especially if we think of the lasting quality of objective colours as their main characteristic. I therefore add a short fifth chapter to the first part of the thesis, in which I discuss these objective ideas of colour. It is quite fitting to open a new chapter for them, as they are the only kinds of things which cannot be seen as straightforwardly as physiological, physical and chemical colours can be.

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<sup>17</sup> David McNaughton's comparison between moral values and secondary qualities suggests such a parallel (even if I do not think that his argument is conclusive). *Moral Vision: An Introduction to Ethics* (1992, ch.4).

### 3. Polarities and Urphenomena

"Polarity" and "Urphenomenon" are the two central notions in Goethe's natural philosophy. Living nature, according to Goethe, is alive by virtue of it being acted upon by polar forces; these are not unlike magnetic forces, which are indeed their prime example, but also include spatial polarities, polarities of gender, temperature, aesthetics and so on, so that an infinite number of polarities underlies the whole of nature. These polarities become manifest in appearances ("Erscheinungen")<sup>18</sup>. When we grasp a phenomenon we grasp the principle (or principles) which underlies the appearance. Simple examples from our everyday lives can be found in language: behind allophones and individually written letters we grasp phonemes and graphemes (the phenomena) which make up meaning.

I shall return to the notion of phenomena throughout the first part of this thesis, as Goethe is by no means clear about what and how exactly they exist. For now it is important to remember that when I refer to phenomena I mean Goethean phenomena which are *not* contrasted with noumena as in the Kantian tradition. Goethean phenomena are different from appearances (Kantian "phenomena"), because they are themselves not timebound and can be forced to repeat themselves in various experiments. On the other hand, they are unlike Kantian "noumena" because they can be grasped in appearances.<sup>19</sup>

The closest understanding of Goethean phenomena may lie in his phrase "the conditions (Bedingungen) under which colour phenomena appear". These conditions are not to be confused with causes (Ursachen).<sup>20</sup> Rather, conditions are other phenomena. The appearance of colour as such, for instance, is conditioned by the phenomena of light and darkness and turbidity, as well as by temperature, textures of surfaces, and other perceivable aspects. Phenomena are to be explained by other phenomena so that a complete explanation of one appearance will be like a complete

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<sup>18</sup> The word "Erscheinung" is best translated as "appearance"; especially for Goethe and Hegel, however, one should keep in mind that the emphasis is on the appearing ("das Erscheinen") of something, not on the contrast between appearance and reality often associated with the word "appearance". (see also glossary)

<sup>19</sup> "Phenomena, which others may also call facta are naturally certain and determined, yet often indetermined and weak when they appear." - "Die Phänomene, die wir andern auch wohl Facta nennen, sind gewiß und bestimmt ihrer Natur nach, hingegen oft unbestimmt und schwankend, insofern sie erscheinen." ("Erfahrung und Wissenschaft", HA13, p.23)

picture of nature on the level of phenomena, with this one appearance at some arbitrary point within the picture. Because all phenomena interact, their conditions of appearance are not a means of classification. Although there are necessary and sufficient conditions for each individual manifestation of a phenomenon, these are not its essence (Wesen), as the same phenomenon (i.e. Wesen of the appearance) can appear in a great variety of conditions. In his essay "Erfahrung und Wissenschaft" ("Experience and Science")<sup>21</sup> Goethe describes phenomena as a "series of steps" ("Stufenfolge") in the following way:

#### a) Empirical Phenomena

The lowest level is that of empirical phenomena. Empirical phenomena can be observed by anyone as they manifest themselves in everyday appearances. Examples of empirical colour phenomena are rainbows, after-images and coloured shadows.

#### b) Scientific Phenomena

Empirical phenomena can be raised to the level of scientific phenomena in experiments which force them to repeat themselves under varying conditions. During the experiment hypotheses are formed and tested until we discover which relevant features our appearances have in common. If we can see the same pattern in all experiments we have found a scientific phenomenon. Examples are the generative patterns from blue to red and from yellow to red on black and white boundaries (see below).

#### c) Pure Phenomena: Urphenomena

The more varied the conditions are under which a phenomenon appears the purer it is. The true colour Urphenomenon governs all colour appearances. Goethe encourages

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<sup>20</sup> "Erfahrung und Wissenschaft", HA13, p.25

<sup>21</sup> Published 1789 (hence before the main body of the *Farbenlehre*); HA13, pp.23-25.

diversity in experiments to make us see the same in different appearances and to make us look out for exceptions, which then lead to new experiments since exceptions show that we have not found the pure phenomenon yet.

The one pure phenomenon underlying all colour phenomena is the polarity between light and dark which expresses itself in a turbid medium as the colour opposition of yellow and blue. This Urphenomenon is so strong and lasting that it could even be sent by post: Goethe sent Hegel a drinking glass which had a yellow ornament on the outside which turned blue when the glass was filled with something dark.<sup>22</sup> Although the glass might be more correctly described as a lasting opportunity for watching the Urphenomenon rather than as an Urphenomenon itself, it is still an amazing example of what Goethe means by his notion. (More famous even than Goethe's colour Urphenomenon is Goethe's belief that there is such a thing as an "Urplant", which is the manifestation of all "plantness".)

Not only Schiller saw the danger of Goethe confusing phenomena as external objects of perception with ideas:<sup>23</sup> Wittgenstein too warns of the danger of confusing a phenomenon ("Urbild") with the object itself. He rightly suggests that someone like Goethe wishes to keep the phenomena steady at all cost in order to get a closer look at them ("Das kommt nun daher, daß man den Merkmalen des Urbilds einen Halt in der Betrachtung geben will").<sup>24</sup> Thus Goethe might have been looking for his Urplant or the Ur-colour-phenomenon in too literal a way, thereby confusing phenomenon and object and hence demanding properties of the object which only the phenomenon can have.

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<sup>22</sup> Letter from Goethe to Hegel. 13th April, 1821.

<sup>23</sup> The famous conversation between Goethe and Schiller on the nature of the Urplant (idea or genuine plant) took place in July 1794.

<sup>24</sup> *Vermischte Bemerkungen (On Culture and Value)*, 1931, pp.469-70 - For full quotation see footnote in chapter IV, section 2.6.

## 4. Conditions for Colour Vision

### a) Colour Vision in General

According to Goethe there are three major conditions to be fulfilled for us to see colour:

First of all, we can see colours only when there is light - in this sense light makes colours appear, and in this sense colours are the deeds of light. Light itself, on the other hand is not coloured and hence not visible; it only becomes visible on something darker than itself (see also ch.VI). Hence colour appears where light and darkness meet - most obviously on opaque surfaces.

Secondly, the highest Urphenomenon regarding colour is colour as the "deed and suffering of light and darkness", which occurs in turbidity; so all colour appearances must partake of turbidity. That they indeed do so is really quite obvious: Our visual world is never perfectly transparent, opaque, light or dark (otherwise it would be invisible). Hence it is, if ever so slightly, turbid (again, see ch.VI).

A third necessary condition for the appearance of colour is a healthy organ of vision. While the first two conditions may be considered as objective, this third condition adds a necessary subjective aspect. We thus get two polarities right at the beginning: that of light and darkness, which can be united in objective colour phenomena, and that of the eye and external colour, which are united in the process of seeing colours. As with all polarities such a unification can be closer to one side or the other. Thus just as some colours are closer to light and some closer to darkness, some colours depend more and others less on the eye of the perceiver.

### b) Seeing Specific Colours

The next level of explanation is that of explaining individual colours rather than just colour as such. Goethe's next Urphenomenon is therefore that of yellow appearing nearest to light and blue appearing nearest to darkness. These can be mixed into green

(provided that both colours are pure), or can be individually intensified until each of them reaches red.<sup>25</sup> We thus arrive at four further polarities:

1. Yellow versus blue, when both are pure colours.
2. Mixed versus unmixed - two pure colours can be mixed into one secondary colour; yellow and blue mix to yield green, red and yellow yield orange, and red and blue purple. From this it follows that each pure colour has one mixed colour as its complementary (yellow-purple, red-green, blue-orange).
3. Of the three primary colours yellow, red and blue, the polarity between blue and yellow is basic because only they can be both mixed and intensified.
4. A further polarity is therefore that between intensification and moderation: yellow and blue are intensified towards red, but moderated or weakened towards green. This opposition will be of particular importance for the moral and aesthetic effect of colour.

Goethe is not always clear whether it should be blue or purple that is the polar opposite of yellow. Rather than calling this an inconsistency, however, we can consider it an advantage: There can be several colour polarities which interact across levels and thus make Goethe's *Farbenlehre* closer to nature than a strict hierarchy would do. Furthermore, this way we can explain how one level of explanation relates to another without having to take sudden leaps. Because there are two colour circles underlying Goethe's *Farbenlehre*, the polarities change depending on the context in which we consider them (see also chapter VIII). More important than abstract polarities are the actual<sup>26</sup> interactions of light and dark with physical objects. Light and dark, which are themselves ideal (see ch.VI) can thus physically be represented by white and black (Fl.§§18,249).

A major Goethean rule derived from his *Urphenomena* is how yellow and blue behave on a black and white boundaries: Yellow appears where there is dark over light, and blue where there is light over dark. One typical example of this rule is smoke appearing yellow in front of a white wall and blue in front of a black background. But

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<sup>25</sup> Fl.introduction, p.326 (Eastlake, p.lvi); also §160; §§213-217; §319

Schopenhauer writes that this basic phenomenon of light and turbidity yielding red at intensification was already mentioned in Aristoteles' *Meteorologicis* 3,4 (S&F, §14, p.285)

<sup>26</sup> The German word "wirklich" is more suitable than the English word "actual" as it combines the sense of "wirken" ("to act upon") with the meaning of reality. (see also appendix)

the appearance of one colour "over" the other can also be taken quite literally as "over and above". I am lucky enough to observe this phenomenon every morning: I sleep in a west-facing room with light white cotton curtains through which I can see the black shadow of the window frame. So I have two black and white boundaries which are white above black on the top of the window frame and black above white a few inches further down. The curtain acts as a turbid medium, so that I can see a strong yellow fringe underneath the black shadow of the frame and a strong blue fringe above it.

The phenomenon of coloured fringes is related to the one of coloured shadows. Goethe claims that we only ever come across monochrome shadows when there is a singular bright light source, which hardly ever happens in natural surroundings because there are almost always reflections of light or even several light sources. Thus most shadows are indeed at least slightly coloured and correctly represented as coloured by impressionist artists (most famously perhaps in Monet's "haystack in winter paintings").

## II

### SCHOPENHAUER: PHYSIOLOGICAL COLOURS & STRONG SUBJECTIVISM

Strong subjectivism claims that "There is no such thing as objective colour". This is, perhaps surprisingly, about the most frequent remark I get from people when I mention that I study colour.

"But surely, that's totally subjective!"

"What is?", I then ask.

"Surely, we all see colours differently - I have a flatmate who..."

and then I get some strange story about a friend who remembers telephone numbers by colours, and another who feels sick when there is too much pink around her (don't we all?), another who believes in colour therapy, and yet another who can hear and smell in colour (whatever that is supposed to mean). It seems that many people who don't think that colour is best explained by physics go to the other extreme and treat colour as subjective on a personal level - "Oh, you are interested in psychology then."

From this I conclude that we have some strong intuitions about colour being essentially subjective. But before I tackle three main arguments in support of this intuition I shall discuss Schopenhauer's subjectivist account of colour, namely Schopenhauer's theory of colour as expressed in *Über das Sehn und die Farben*. Schopenhauer bases his theory on experimental evidence from Goethe on the one hand, and on his own philosophy on the other. In the first section of this chapter I therefore compare Goethe's and Schopenhauer's general approaches, and in the second section summarise and criticise Schopenhauer's *Über das Sehn und die Farben* in more detail.

Schopenhauer's claim that colours are nothing but effects on our eyes/brains is echoed (unknowingly, I believe) by Hardin in his book *Color for Philosophers*. I shall treat his arguments together with those of other recent subjectivists in the third section of this chapter. Altogether, I shall conclude that an exclusively subjectivist (or "strong subjectivist") account of colour is necessarily insufficient.

## 1. Schopenhauer and Goethe

Schopenhauer's mother Johanna Schopenhauer moved to Weimar in 1806 where she soon opened a literary salon, one of whose frequent guests was Goethe. The poet read Schopenhauer's *On the Fourfold Root of the Principle of Sufficient Reason* in 1813 and liked Schopenhauer's emphasis on understanding (Verstand) and intuition (Anschauung)<sup>1</sup> rather than on reason (Vernunft) and concepts (Begriffe). So when Schopenhauer moved to Weimar in November 1813 and showed interest in Goethe's *Farbenlehre* the two met regularly to do colour experiments and to discuss philosophy. Both opposed Newton's *Optics*, both laid great emphasis on physiology, and both agreed that seeing is theorizing. In other words: Both Schopenhauer and Goethe did not believe in the possibility of purely objective perception of phenomena as suggested by the experiments of Newton and his followers.

But soon Schopenhauer must have interpreted their common experiments according to his own philosophical thought, and the differences between the realist and the idealist led Goethe to write the famous verse:

"Trübe noch gerne des Lehrers Bürden,  
wenn die Schüler nur nicht gleich Lehrer würden"<sup>2</sup>

When Schopenhauer left Weimar for Dresden in May 1814 he parted from Goethe on friendly terms - Schopenhauer still admiring Goethe and Goethe still glad to have found a supporter of his *Farbenlehre*. Schopenhauer rather quickly wrote his little work *Über das Sehn und die Farben* while he was already thinking about *The World as Will and Representation*. When in June 1815 Schopenhauer sent his manuscript to Goethe asking him to write a preface for it, Goethe was extremely busy and not very interested. After several exchanges of letters Goethe returned the manuscript without the requested preface. This is not surprising if one reads their letters in which Schopenhauer, despite his openly shown admiration for Goethe, insists that it was he himself who wrote the first theory of colour.

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<sup>1</sup> I use the common translation of "Anschauung" as "intuition", although I believe that in many contexts "contemplation" might be a more suitable translation than "intuition" for reasons given in the appendix.

<sup>2</sup> "I would happily carry the teacher's burden, if students didn't immediately turn into teachers."

## 1.1. Agreements between Schopenhauer and Goethe

In *Über das Sehn und die Farben* Schopenhauer overall judges Goethe's Farbenlehre extremely positively. Even in the second edition, in which Schopenhauer has added further criticism of Goethe<sup>3</sup>, he writes:

"the correctness of Goethe's color theory is to me also still just as evident as it was forty-one years ago when he showed me his experiments. I can therefore assume that the spirit of truth...has not forsaken me." <sup>4</sup>

In his last section Schopenhauer too praises Goethe's "scientific achievements" (p.288/76), calls those people who deny them blind or liars (p.290/78), and for the last time sets Goethe's truths positively against "Newton's tricks" (p.297/84). Schopenhauer emphasizes two main achievements of Goethe:

"Goethe had opened the way through a twofold service. First, in as much as he broke the old delusion of Newton's erroneous theory, he restored the freedom of thought on this subject..."<sup>5</sup>

This passage suggests that Schopenhauer himself believed in Newton's theory until he met Goethe. It is thus not surprising that the two men liked each other - the elder opening the eyes of the younger to what the younger wanted to see anyway. Goethe's re-opening of the discussion on colour is praised by Schopenhauer again and again.

"Goethe's second service is that he delivered in full measure what was promised in the title of this excellent work: data *for* a theory of color. They are important, complete, and significant data, rich material for a future theory of color." (pp.4-5).<sup>6</sup>

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<sup>3</sup> Among them most of §14, a fraction of which appeared as part of §13 : "Only on two points...in compendium" (pp.75-76), and "The grave injustice..." (p.83 to the end), as well as the one sentence on page 75 beginning with "Goethe has never forgiven me".

<sup>4</sup> "...die Richtigkeit der Goetheschen Farbenlehre ist mir noch ebenso einleuchtend als vor 41 Jahren, da er mir selbst die Experimente vorzeigte. So darf ich denn wohl annehmen, daß der Geist der Wahrheit...mich nicht verlassen hat.." (S&F, p.194/2 - double references to page numbers refer first to the German edition of *Über das Sehn und die Farben* (1989) and then to Payne's translation (1994)).

<sup>5</sup> "Goethe hat mir den Weg eröffnet durch ein zwiefaches Verdienst. Erstlich, sofern er den alten Wahn der Newtonischen Irrlehre brach und dadurch die Freiheit über den Gegenstand wiederherstellte.." (S&F, Introduction, p.197/4)

<sup>6</sup> "Das zweite Verdienst Goethes ist, daß er in seinem vortrefflichen Werke in vollem Maße lieferte, was der Titel verspricht: Data *zur* Farbenlehre. Es sind wichtige, vollständige, bedeutsame Data, reiche Materialien zu einer zukünftigen Theorie der Farbe." (S&F, p.198/4-5)  
Please note that the original title of Goethe's work is *Materialien zur Farbenlehre*.

This material, however, is in itself insufficient to be a theory. In a letter to Goethe Schopenhauer writes:

"If I compare your Farbenlehre to a pyramid, my theory constitutes its tip, the indivisible mathematical point from which the whole building extends and which is so essential that without it it would not be a pyramid, while at the bottom one can cut off slices without it ceasing to be pyramid."<sup>7</sup>

Schopenhauer obviously sees his own theory as the perfection, the final shape of Goethe's work. One could, however, argue that Schopenhauer completely misunderstands Goethe. Goethe may not have wanted any (or at least any one) final theory at all.<sup>8</sup> But we lose a deep connection between Goethe and Schopenhauer if we ignore Goethe's statement that all seeing is theorising (preface), which can be read to mean that all seeing is done with the help of understanding, and that hence there is no such thing as a pure datum, and that pure data, were they to exist, could not help us to understand anything:

"For the mere looking at a thing cannot bring us forward. Each look turns into observation, each observation into pondering, each pondering into connecting, and thus one can say that we already theorise with each attentive look at the world."<sup>9</sup>

On the other hand this also means that we cannot be wrong about the data themselves were we to reach them.<sup>10</sup> Hence Goethe: "Illusions do not derive from our senses but from our judgments."<sup>11</sup>

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<sup>7</sup> "Vergleiche ich Ihre Farbenlehre einer Pyramide, so ist meine Theorie die Spitze derselben, der unteilbare mathematische Punkt, von dem aus das ganze große Gebäude sich ausbreitet, und der so wesentlich ist, daß es ohne ihn keine Pyramide mehr ist, während man von unten immer abschneiden kann, ohne daß es aufhört Pyramide zu sein." (letter from 11th November, 1815; HA2, p.173)

<sup>8</sup> Wittgenstein certainly supports Goethe's general approach (see also ch.IV, sect.3.4)

<sup>9</sup> "Denn das bloße Anblicken einer Sache kann uns nicht fördern. Jedes Ansehen geht über in ein Betrachten, jedes Betrachten in ein Sinnen, jedes Sinnen in ein Verknüpfen, und so kann man sagen, daß wir schon bei jedem aufmerksamen Blick in die Welt theoretisieren.", (Fl. preface, p.317, my translation; corresponding passage in Eastlake, p.xl).

<sup>10</sup> The process for reaching the pure data would presumably be some kind of phenomenological reduction - another interesting link to Goethe which I cannot develop in this thesis. Instead I refer back to Goethe's use of pure data in my Wittgenstein chapter.

<sup>11</sup> "Die Sinne trügen nicht, das Urteil trägt." (M&R 295; HA12,p.406). Safranski interprets this maxim as one attitude towards the world, which Goethe and Schopenhauer have in common. (*Schopenhauer und die wilden Jahre der Philosophie*, p.266)

Goethe also speaks of seeing "pictures" ("Bilder"). Our physiology allows us (or forces us) to actively participate in the process of seeing, as if our understanding (Verstand) was framing the seen into a picture:

"Most of all we have to remember that we are strolling in the realm of pictures.<sup>12</sup> When it comes to seeing, the limited seen is always the thing that we primarily notice, and in the current case [...] of refraction [...] only the limited seen, the picture is under observation." and "The seen must be limited."<sup>13</sup>

Goethe's description of an after-image as a "coloured appearance...[which] originates from a picture which now belongs to the eye"<sup>14</sup> might be extended to mean that everything seen consists of pictures belonging to the eye. This would make Goethe an Idealist in the literal sense of the word "idea"- idea: "outer appearance" or "looks", but also "Urbild", "Idea" in the Platonic sense.<sup>15</sup>

Schopenhauer and Goethe therefore agree within Schopenhauer's world as representation (Goethe's world of appearances): For both the process of perception always consists of an object and a subject. The powers of the subject are limited by the subject's physiology which limits the numbers and kinds of objects which are perceivable, a fact most obvious in cases like colour blindness. Thus Goethe's equation of colour with that part of nature which exists *for* our sense of vision entails that without this sense of vision it would not exist, which is why blind people cannot partake of it.<sup>16</sup> This is a clearly idealist view of the world leading to the statements that objects are only Schopenhauerian presentations (Vorstellungen)<sup>17</sup> or Goethean pictures (Bilder), made up of those things that are presented to us. Thus there might be other things outside our field of vision which we are unaware of (note the parallel to Plato's cave where the prisoners only see what is presented to them).

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<sup>12</sup> Eastlake translates this section less poetically with "...we have to do with circumscribed objects".

<sup>13</sup> "Vor allen Dingen erinnern wir uns, daß wir im Reiche der Bilder wandeln. Beim Sehen überhaupt ist das begrenzt Gesehene immer das, worauf wir vorzüglich merken, und in dem gegenwärtigen Falle (...) der Refraktion (...) kommt nur das begrenzt Gesehene, kommt nur das Bild in Betrachtung." (Fl.§219)  
"Das Gesehene muß begrenzt sein." (Fl.§227)

<sup>14</sup> "...farbige Erscheinung... entspringt aus dem Bilde, das nunmehr dem Auge angehört". (Fl.§49)

<sup>15</sup> I shall return to Platonic Ideas in Schopenhauer and Goethe in ch.V.

<sup>16</sup> Fl.Einleitung, p.324; Eastlake, Introduction, p.liv.

<sup>17</sup> See appendix for a detailed account of "Vorstellung".

## 1.2. Differences between Goethe and Schopenhauer

We should not forget that Goethe is inconsistent: On the one hand he writes of seeing as theorising and stresses the active role of the subject in all perceptive acts, but on the other hand he remains a realist. It is true that for him people play an important role in forming the world as they see it, yet Goethe would hardly come to the conclusion that the real world might be *substantially* different from the way we see it. Quite on the contrary, Goethe's belief in the possibility of seeing Urphenomena in nature, shows how close he thought the real world of Urphenomena was to that of everyday appearances. We find that ultimately the difference between Schopenhauer and Goethe is that between idealism and realism. This difference is most beautifully expressed by Schopenhauer himself:

"But that Goethe was so completely *realist* that it absolutely would not come into his senses that *objects* in themselves only exist in so far as they are *presented* by the knowing subject. What, he said to me once, looking at me with his Jupitereyes, light is only to be there in as far as you see it? No, *you* would not be there if the light did not see *you*."<sup>18</sup>

In my view, the differences between Goethe and Schopenhauer are more important than the latter says they are. They regard

1. the true polarity of colours which Goethe believes to be in nature and Schopenhauer places in the eye/brain, and
2. the production of white from other colours - the possibility of which Goethe denies completely, Schopenhauer however shows to be possible.

The production of white I shall discuss in some detail in chapter VII, where I defend the view that white cannot be mixed by mixing other, hence darker colours. Schopenhauer's solution is the following: The colours should not be physically mixed but rather be united on the retina itself - i.e. by simultaneously seeing these colours (S&F,§10). The production of white is thus a purely physiological process which

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<sup>18</sup> "Aber dieser Goethe... war so ganz *Realist*, daß es ihm durchaus nicht zu Sinne wollte, daß die *Objekte* als solche nur da seien, insofern sie *vorgestellt werden* von dem erkennenden Subjekt. Was, sagte er einst zu mir, mit seinen Jupiteraugen mich anblickend, das Licht sollte nur da seyn, insofern Sie es sehen? Nein, *Sie* wären nicht da, wenn das Licht *Sie* nicht sähe." (*Arthur Schopenhauer. Gespräche*, ed. by A.Hübscher (1971) as quoted in Safranski (1990, pp.275-6)

occurs automatically given the right conditions (i.e. if it has sufficient reason to occur).<sup>19</sup>

This problem is linked to the first difference between Schopenhauer qua idealist and Goethe qua realist. It depends entirely on the ontology of colour whether we accept Schopenhauer's proof of mixing white out of colours, or not. He has empirically shown that two colours can be so placed that it appears that they mix to a white. So within his own theory in which colour *is* the effect on the eye, he has indeed proven that white can be produced from other colours. A colour realist, however, would disagree with this claim since it is not a mixing of the colours themselves that produces white, as the colours external to the human body continue to exist unmixed.

## 2. Über das Sehn und die Farben

In order to understand how fundamental the difference between Goethe and Schopenhauer really is let me now summarise Schopenhauer's theory of colour: If one accepts Schopenhauer's philosophy of the world as representation as described in *Über die Vierfache Wurzel des Satzes vom zureichenden Grunde* (VWZG) and the first book of *Die Welt als Wille und Vorstellung* (WWVI) then his theory of colour (as given in S&F) follows naturally:

A colour is an effect in the eye. With the help of our understanding (Verstand) colour sensations are interpreted as effects whose causes are then identified as things in space and time (usually as coloured objects in the external world). This process is necessary in the same way in which mechanical processes are necessary - i.e. the process of seeing coloured objects follows the Principle of Causality/Becoming (as described in VWZG, ch.4). That this process is independent of our faculty of reason (Vernunft) can be seen in the case of optical illusions which we *see as* illusory objects even when we *know* (by reason) that they are something else.

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<sup>19</sup> Schopenhauer thus explains "additive colour mixture", a notion which I shall return to in the last section of this chapter (3.3.c); Schopenhauer's account will be described in further detail in ch.VIII, 1.1.

Schopenhauer's account of colour vision is based on the presupposition that the retina consists of two halves which complement each other to yield one whole. Although he makes finer distinctions Schopenhauer derives the essential thought from Goethe. "The retina can be in two completely opposite states depending on whether light or darkness act upon it."<sup>20</sup> This leads to the first of Schopenhauer's divisions of the retina, the "intensive division". The equation of a white, black or grey picture on the retina (the effect) with light, dark or half shadow (both S&F,§3), as well as the spatial organisation and the geometric relation between the size of the image and the distance and size of the object seen (§1) can also be found in Goethe's *Farbenlehre*.<sup>21</sup> Furthermore, the colour oppositions found in the "qualitative division of the retina" are based on Goethe's colour circle.<sup>22</sup> But Goethe does not explain them as a mathematical function like Schopenhauer does: In an astonishingly certain manner Schopenhauer divides the colours into three complementary pairs of primary colours and gives them mathematical values. These values depend on the intrinsic lightness of each colour - yellow for instance is the lightest colour, taking 3/4 of the retina and leaving its complementary purple with 1/4. The other two pairs are blue and orange (1/3 and 2/3) and red and green, which are equally 1/2 each.<sup>23</sup>

There are thus three kinds of division of the retina:

1. intensive (§3) : monochromatic
2. extensive (§4) : to create a field of vision
3. qualitative (§5) : chromatic colours

The first and the third division both assume a whole, of which the seen colour is one half and its complementary colour produced in the eye is the other (as seen in after-images). These two kinds of division occur simultaneously and can be combined so that a bluish-black would yield a whitish-orange after-image. The second division is a spatial one: it explains why our fields of vision can include several and even a vast amount of different colours rather than just one undifferentiated colour area.

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<sup>20</sup>"Die Retina befindet sich, je nachdem Licht oder Finsternis auf sie wirken, in zwei verschiedenen Zuständen, die einander völlig entgegenstehen." (Fl.§5)

<sup>21</sup> Goethe's complete section on physiological colours is relevant, but especially §§ 5-8, 13, 15-18.

<sup>22</sup> Fl. parts V - VIII. especially §§ 48-50, 55-56, 58-61.

<sup>23</sup> No matter how surprising these a priori proportions may seem to be, they have been taken up in some major art theories, as for instance those by Albers and Itten. But contrary to Schopenhauer, these theories use the proportions for the determination of lightness alone, not for the identification of hue. In a sense they thus extend Schopenhauer's first intensive division of the retina to colour vision.

According to Schopenhauer, the whole process of colour vision is mechanical, and mechanical is its further physiological interpretation: we do not in fact perceive colour patches (as on a painter's palette) but coloured objects (S&F, §1). So the physiological process of the eye is followed by a physiological process of the brain, namely the application of the first principle of sufficient reason which places the colour patches of our sensations into the temporal and spatial external world.

Please note that the use of the term "sensation" does not fall under P.Hacker's criticism.<sup>24</sup> Hacker distinguishes rightly between sensation and perception, and like Hacker Schopenhauer calls perception of colour the seeing of external coloured objects, even if perception includes processes of the understanding (Verstand). What Schopenhauer calls "colour sensation" is more immediate and has nothing to do with the identification or recognition (Erkennen) of a colour as a particular colour of something. Thus Schopenhauer writes in his first chapter "On Vision": "The newborn infant has the sensation of light and color before it intuitively perceives and knows the luminous or colored objects as such."<sup>25</sup> He also clearly says that "the understanding converts the sensation into intuitive perception".<sup>26</sup> Hence one should read Schopenhauer's term "sensation" as a neurophysiological term to avoid Hacker's criticism, and the misleading phrase "colour sensations" or "sensations of colour patches" must be translated as "neurophysiological processes whose cause is placed in colour by the functioning of our reason".

The reason why Schopenhauer himself does not choose a less misleading terminology lies, I believe, in his dualist philosophy in which sensations play an essential role. For we must remember that the account given in *Über das Sehn und die Farben* only covers the explanation of colour in the world as representation - not its metaphysical aspect in the world as will. (I shall introduce a possible metaphysical connection between colour and the Will on the one hand, and colour and Platonic Ideas on the other in chapter V.)

Schopenhauer defines the connection between physiology, knowledge (Erkenntnis) and representation (Vorstellung) in his later work *Über den Willen in der Natur* and in parts of his main work<sup>27</sup> where he clearly states that Erkenntnis is

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<sup>24</sup> *Appearance and Reality* (1987).

<sup>25</sup> Payne, p.21 - the phrase "intuitively perceives and knows" is an apt but free translation of "erkennt und anschaut" - literally: "recognises and contemplates" - "Das neugeborene Kind empfindet Licht und Farbe, ehe es den leuchtenden oder gefärbten Gegenstand als solchen erkennt und anschaut." (S&F, p.218)

<sup>26</sup> "Verwandelt der Verstand die Empfindung in Anschauung..." (ibid)

<sup>27</sup> Particularly in §18 of the second volume of *Die Welt als Wille und Vorstellung*.

Vorstellung which in turn *is* a physiological process the result of which is a mental picture. So, for Schopenhauer the knowledge of colours as described in *Über das Sehn und die Farben* is an entirely physiological process, and I shall now give some internal criticism of this theory.

## 2.1. Criticism of Schopenhauer's account

There are two main criticisms of Schopenhauer's theory of the qualitative division of the retina: Schopenhauer neither shows it to be necessarily true (he calls it a "mere hypothesis" though he later says that he has total confidence in his theory (P&P §104)), nor does he give sufficient criteria to identify individual colours with it.

If we take Schopenhauer's fractions (§5) and multiply the numerators over the denominator of 12 we arrive at the following values: yellow 9, orange 8, red and green 6, blue 4, and purple 3. It seems strange that the gaps between some colours are bigger than those between others - especially that purple should be so much closer in value to blue than to red seems simply wrong.<sup>28</sup>

One solution might be to make the steps between the colours equal. If we keep yellow the lightest and purple the darkest colour with the values 9 and 3, we get 5 and 7 as in-between values:

yellow - purple	9 - 3
orange - blue	7 - 5
red - green	5 - 7

This, however is obviously wrong since it gives green a greater lightness than red (and if we reversed them red the same lightness as orange - circle S2).

The easiest way out is to argue that there are four primary colours with yellow and blue as opposites of light and darkness (say,  $3/4$  to  $1/4$ ) and red and green as the same ( $1/2$ ). Orange then gets the in-between value of  $15/24$  and purple of  $9/24$ , and their odd fractions well represent their odd status between primary colours (circle S3).

If we wanted to stick to six primary colours *and* keep red and green in equal values *and* yellow and purple as main lightness opposites, we'd have to give the values of  $9/24$  to blue and  $15/24$  to orange. But then we might wonder whether blue does not deserve a better value from an a priori judgment (which is what

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<sup>28</sup> See illustrations end of this section.

Schopenhauer's assigning of fractions to colours is all about), and whether the distance between purple and blue compared to purple and red is not too small.

Either way, however, and this is a more serious problem, Schopenhauer reduces the qualitative aspect of colour to quantities of lightness which are not in themselves sufficient to identify individual colours. This is most obvious in the case of red and green which both have the value  $1/2$ . For every colour but yellow or purple there is another colour with the same value as well as presumably one grey shade (this is true for the original values of Schopenhauer as well as for my alternative solutions).

What needs to be added but is only hinted at is a truly qualitative polarity such as that between warm and cold colours. This could be done numerically if one wanted to - either by adding plus and minus signs or by changing the values to something like a clock face with yellow at twelve o'clock. Then however the complementaries would no longer be arithmetically but only geometrically obvious. That a geometrical construction of colour space is more helpful to the understanding of colour than a priori arithmetic relations between colours, I argue for in chapter VIII.

Schopenhauer's Qualitative Partition of the Retina (S&F §5)

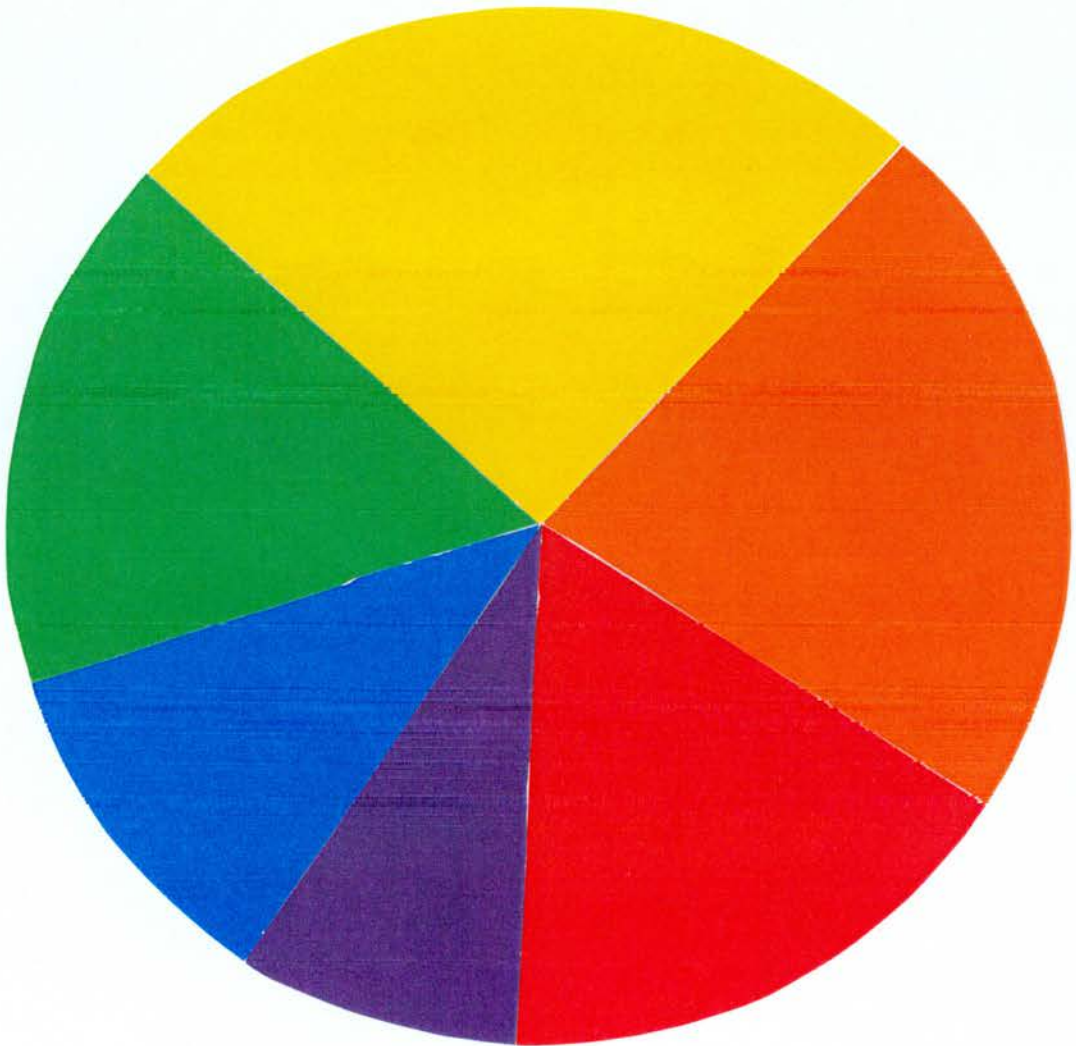
Yellow  $\frac{3}{4}$  - purple  $\frac{1}{4}$



Orange  $\frac{2}{3}$  - Blue  $\frac{1}{3}$



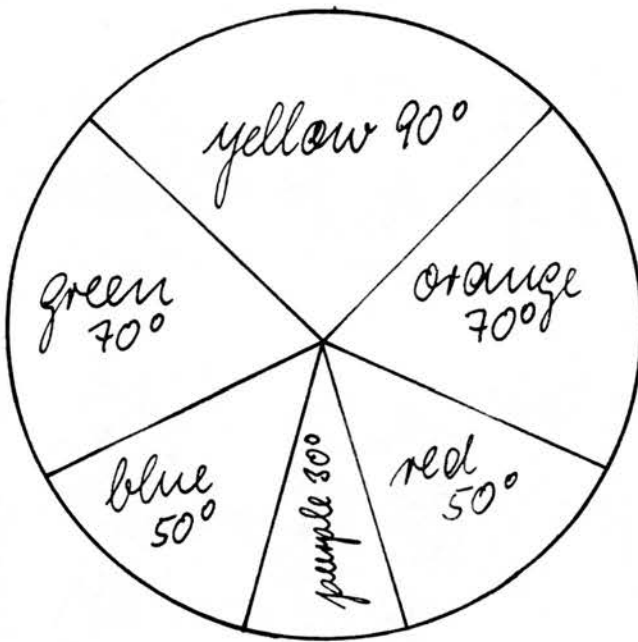
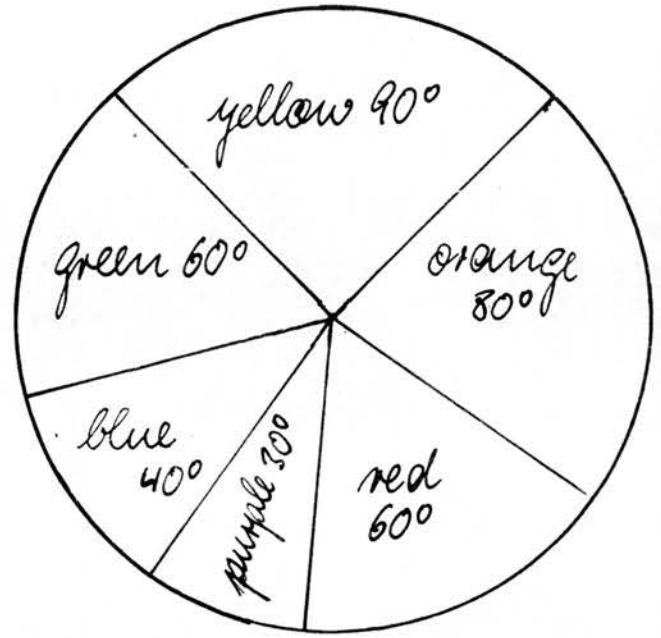
Red  $\frac{1}{2}$  - Green  $\frac{1}{2}$



Comparison Between Schopenhauer's Solution and my Alternatives

S1: Schopenhauer's solution

yellow: 90 degrees  
orange: 80 degrees  
red : 60 degrees  
green : 60 degrees  
blue : 40 degrees  
purple: 30 degrees

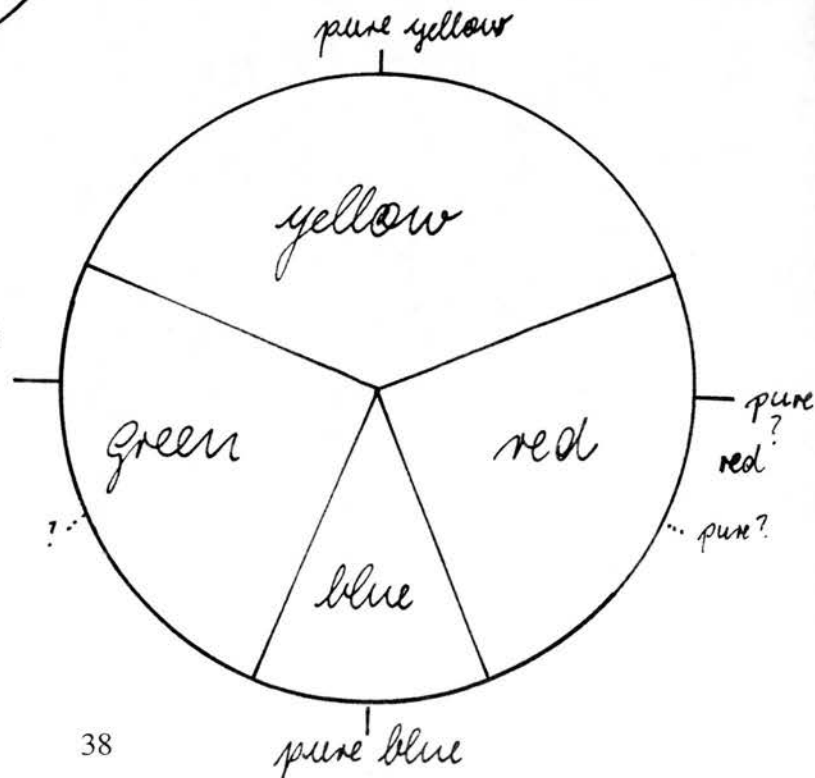


S2: My first alternative

yellow: 90 degrees  
orange: 70 degrees  
green : 70 degrees  
red : 50 degrees  
blue : 50 degrees  
purple: 30 degrees

S3: My second alternative

yellow : 135 degrees  
+ blue: 45 degrees  
green : 90 degrees  
+ red : 90 degrees



### 3. Strong Subjectivism: The Arguments

Schopenhauer's theory of colour is only subjectivist as long as we remain within his "world as representation", in which lightness, darkness and colour are nothing but states or modifications of the eye. Yet similar theories have since been taken to be complete accounts of colour. C.L.Hardin, for instance, holds a such a view: "We are to be eliminativists with respect to color as a property of objects, but reductionists with respect to color experiences."<sup>29</sup> Hardin's strong subjectivism makes two claims: first, that there is no such thing as objective colour, and secondly, that subjective colour, i.e. colour experience, can be reduced to something else, namely a physical state within our heads. This second claim does not necessarily follow from the first claim. Yet subjectivism without reduction of colour experience to physical states easily leads to solipsism.

Generally speaking, there are six arguments which claim to prove that there is no such thing as objective colour. I shall divide these arguments into three groups as follows:

1. Colour vision depends entirely on the perceiver because

- a) different people react differently to different colours: they have different favourite colours, associate different colours with different emotions (or numbers or vowels or whatever);
- b) there are clear cases of abnormality in colour vision which obviously hinder the seeing of colour and the formation of colour concepts (my colour blind friend often does not understand me when I talk about colour relations).

2. It is impossible to know whether one person sees the same colour as another.

3. There is no objective scientific account of all colours:

- a) we hardly ever encounter pure wavelength colours; instead most colours we see are metamers (i.e. mixtures of various wavelengths);
- b) neither is there a chemical formula which all paints and dyes share;
- c) there is altogether no one scientific theory which explains all colour appearances, i.e. luminous and reflected colours, surface colour and after-images.

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<sup>29</sup> *Color for Philosophers*, 1988, p.112

I shall tackle these arguments one at a time:

1. Colour vision is entirely perceiver dependent

a) Different people react differently to different colours.

It is true that people have different aesthetic and emotional feelings about colour, but I believe that it is up to psychologists and sociologists to find out in how far these feelings are genetic or are socially determined or otherwise explainable. For while different people react differently to different colours, this problem is not specific to colour. People also react differently to different chemicals, politicians, coldness, crowds and all sorts of things, without us wanting to say that these things are themselves subjective. Thus people prefer the looks or character of one person to another without us saying that the *person* is subjective.

b) Abnormalities in colour vision.

As I shall demonstrate in chapter IX, the fact that a significant minority of the population is colour-blind is not sufficient to argue for a purely subjective account of colour, as we can only define colour abnormalities with reference to normal colour vision, which in turn is defined by public agreement about which distinctions of colour are normal. The decision of who is normal and who is not must therefore be made with reference to public (objective) colour samples.

c) Conclusion

From the fact that colour vision depends at least somehow on the perceiver's eyes and mental/brain states it does not follow that colour is identical to that eye or mental/brain state. There is an important difference between saying that something *is* subjective (an ontological claim) and saying that we know it from subjective experiences (an epistemological claim which I treat under the next heading). Thus colours may "feel" different to different people, but from this it no more follows that the colours themselves have no objective existence than it follows from the different perspectives of my desk that there is no desk of determined shape in my room.

The same people who claim that colour is subjective because of diverging attitudes towards them often also claim that judging art or morals is subjective. That I disagree with all of these statements makes it easier for me to discard the claim about colour. Because this is not the place to defend objective values in general, however,

all I can say is that merely because people have different attitudes towards something it does not follow that this something does not objectively exist or that it does not have objective qualities.

2. It is impossible to know whether one person sees the same colour as another.

Gregory Harding (1991) thought of an experiment of how we could check whether two people see the same thing in the same way. A few experimental details granted (like viewing angles adjusted and subjects being perfectly good imitating artists) the idea is the following: Two subjects are shown the same image and each of them has to draw what they see. If they draw the same thing then they see the same thing.

Applied to colour this experiment might have to be repeated a few times to exclude chance "hits" by a colour blind person who got the lightness right but may have been unsure whether the colour shown was a light orange or a light green for instance, but altogether I think that Harding's experiment offers (in theory at least) the possibility of checking whether two people see the same thing.

As it does not follow that they have the same experience, but only that they represent their experience in the same way, someone might argue that this experiment therefore leaves out the most essential aspect of colour, namely the subjective experience itself. However, in order to argue for the subjectivity of colour by saying that two people do not see the same colour, one has to use the concept of sameness. And the concept of sameness is applied in a very strange way if one does not allow for a representational test of sameness. In a courtcase, for instance, where a witness is shown a photograph and asked "Is this the man you saw?", we do not expect the witness to answer "This is a different experience". For naturally, looking at a photograph is a different experience from witnessing a burglary or murder, but what matters is the *object* of that visual experience. (In Fregean terms one might say that it is the reference (Bedeutung) that matters, not its mode of presentation (Sinn)).<sup>30</sup>

The experimental task for Harding's subjects is to draw *what* they see, not *how* they see it. In other words, he wants them to draw the object of their perception, not their experience of it. The experience and its drawn representation are two

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<sup>30</sup> "Über Sinn und Bedeutung", 1892, reprinted 1986.

different kinds of phenomena, but one might argue like Wittgenstein that there is no other criterion of a visual experience than the representation of what is seen.<sup>31</sup>

But even if one does not want to go this far (for the experience could involve emotions, i.e. lead to different modes of presentation of the same thing) Harding's point is valid: If I was a perfect artist I *could* paint my colour experiences. The difference between my actual experience and my painted representation would be one of what kind of thing they are, not one of sameness as such (just as the difference between a photograph and a real person is one of kind not of identity).<sup>32</sup>

The conclusion from this is stronger than Harding may have realised: Even if his experiment may never be tried out because some of the conditions of being a perfect artist etc. cannot be fulfilled, its mere possibility makes a strong point: When the experimenter compares the drawings of his subjects with the image originally shown there will be an *objective* verdict, and this verdict will be about *objective* similarities or dissimilarities between the painted representations.

So the claim that we cannot know whether other people see the same colours as we do is either trivially true in the sense that empirically I am not able to see through your eyes, or is philosophically flawed, because our criterion for seeing the same thing as someone else must be a public criterion of sameness which can be decided on by third parties and which becomes meaningless if applied to individuals only.<sup>33</sup>

3. There is no satisfactory scientific theory of what a colour objectively is.

a) Colours cannot be identical to wavelengths because we hardly ever (if at all) encounter pure lightwaves.

It is true that most of the colours we see are mixtures of light waves and therefore the identification of colour with wavelength is only useful in laboratory conditions and insufficient or even incorrect in everyday situations. But this is not sufficient to say

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<sup>31</sup> "What is the criterion of the visual experience? - The criterion? What do you suppose? The representation of "what is seen". (P.I., p.198e) :  
"Was ist das Kriterium des Seherlebnisses? - Was soll das Kriterium sein?  
Die Darstellung dessen, "was gesehen wird"."  
(*Philosophische Untersuchungen*, p.529).

<sup>32</sup> Please note how this also relates to Wittgenstein's question why we do not have two different terms for transparent colours and opaque colours. Again the *material* may be different but the *colour* is not.

<sup>33</sup> For to argue that an individual can judge whether two *experiences* are the same is to ignore the problems pointed out in Wittgenstein's "private language argument".

that colour is subjective - there might just be the need for a better physical account (see c).

b) There is no chemical formula that all lasting ("objective") colours such as paints or dyes have in common.

This also is true. Historically most paints and dyes were extracted directly from organic matter (most famously purple from the shell of the purple snail, and indigo from the indigo plant). The colours were then named after their source.<sup>34</sup> Our modern basic colour terms no longer name the physical source of colours but are abstractions from something that colours from various sources have in common. But although colours are unlike natural kinds where we determine by chemical analysis whether something is or is not a member of a kind, this does not mean that all blue things do not have something in common which we are justified in calling "blueness", or that blueness could not be explained some other way (as a family resemblance concept, for instance). For it is not the case that any one person could come along, look at colour samples from different materials, and then arbitrarily decide to call half of them blue and half of them red. For even if people could name the colours thus if it pleased them they could not communicate what they meant by these colour terms. Requests such as "the red disk, please" would become useless (and hence meaningless if one takes a Wittgensteinian view of language).

c) There is no one full physical account of all colour phenomena.

Again I agree, but let me first explain this point: As I said above (a), Newton's original theory that light is made up of an infinite number of colours, which can then be defined by their respective wavelengths, can only be used in laboratory conditions. Most of the time the colours we see are so called metamers, which are mixtures of colours, which appear exactly the same as colours of pure wavelengths. Two light sources of differing colours or three light sources of any even slightly varying colours are sufficient to create any colour.

If this was the only problem with physical accounts we might be able to reduce colours to relatively simple mathematical formulae regarding the mixture of

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<sup>34</sup> This is also why some ancient colour terms are so confusing and have even led to the belief that the ancient Greeks were colour-blind. There was, for instance, a century long debate about whether the term "sil" referred to blue or to yellow (or even to violet). The debate was resolved when it was discovered that "sil" referred to the source of the pigments which could be treated to yield either blue or yellow. (J.Gage, 1993, pp.35-36)

light. The next difficulty, however, is that colours can mix additively or subtractively. A subtractive colour mixture takes place when colour pigments or lit areas are mixed. This mixture is called subtractive because it actually subtracts from the total amount of light (so called "white light") with each colour that is added. Thus the mixture will inevitably become darker than the average darkness of each colour added to the mixture. When a similar amount of all colours is added the mixture will be grey (Hegel calls this grey "oyster grey" - it is also referred to as "brain grey").

In an additive mixture on the other hand, the light total to the mixture increases with each colour added. This is the classical case of Newton mixing all colours of the spectrum back into white. It is also explained subjectively by Schopenhauer who claims that in the case of additive colour mixture it is our eyes which add up the amounts of light of each colour.

One might find a formula for each of the two kinds of colour mixture, but what could not be explained by the same formula is why reflecting, luminous and matt or shiny surfaces can be of the same colour. If I wanted to use a computer to identify colours I would have to programme it in different ways depending on whether the colour it was to identify was emitted from a light bulb, a star or a tv set, or whether it was reflected from a matt or a shiny surface. Furthermore, a computer could not identify colours of after-images, dream or hallucinatory colours, and perhaps even halos, rainbows and other colours that are fleeting though not complicated everyday colour experiences.

The best physical theory so far is that of Edwin Land who can at least accommodate colour contrasts and colour constancy (I return to the way in which surrounding colours influence our colour vision in ch.X). Yet Land too cannot explain why these colours should have anything in common with colours in our dreams, hallucinations, after-images or other clearly subjective cases of colour vision. And last though not least, none of the experiments successfully explains the colour brown which we do not see as a darkened yellow or orange (which is its physical explanation), but quite clearly as a separate colour.<sup>35</sup>

I therefore conclude that there is indeed no satisfactory physical account of all colour phenomena. From this, however it does not follow that colour is purely subjective (see b).

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<sup>35</sup> Berlin and Kay (1969) include brown in their eleven basic colour terms.

#### 4. Conclusion:

1. A strong subjectivist account has no criterion for seeing the same colour as, and yet claims that we each see different colours.
2. Strong subjectivism cannot explain why we can be so sure about the colours of objects around us, and nor can it account for our ability to name (most) colours without hesitation or difficulty.
3. The only argument that strong subjectivism rests on is that there is no unified physical account which explains all colour phenomena. Yet this does not entail that there *could* not be such a physical account. For "absence of evidence is not evidence of absence", and as long as there is no complete scientific account of colour the argument in how far colours are subjective or objective is not decided either way.

What could justify the rejection of strong subjectivism is that it leads to unacceptable consequences, as its eliminativism of objective colour in favour of subjective colour experience leads to the strange conclusion that colour is a mere illusion. If colour is merely illusionary, however, then so is almost all of our visual perception,<sup>36</sup> and our distinction between real objects and genuine illusions (such as hallucinations) breaks down.

Furthermore, strong subjectivism leads to extreme scepticism and possibly solipsism as it does not allow for an objective quality which different people can refer to. One way out of this cul-de-sac is to reduce subjective colour experiences to objective physical states within our heads, which *can* be investigated and talked about by different people. The reduction of something subjective to something objective is, however, intrinsically incoherent (see introduction).

Thus I conclude that strong subjectivism has neither empirical evidence<sup>37</sup> nor philosophical argument on its side, and as it leads either to solipsism (if thought through consistently) or to the philosophically inconsistent reduction of subjective to objective states I cannot support it.

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<sup>36</sup> For colour boundaries visually determine spatial boundaries, of shape as well as of distance and other geometrical relations (see also ch.X).

<sup>37</sup> To be fair to Hardin I have to admit that he does offer scientific causal explanations for some colour phenomena such as after-images or complementary colours. The same evidence is, however, brought to more acceptable conclusions by more moderate "weak subjectivists".

### III

#### HEGEL: AUFHEBUNG OF THE SUBJECT-OBJECT DIVIDE IN THE DISCOVERY OF ENTOPTIC COLOURS

Unlike Schopenhauer, Hegel does not devote a whole book to the defence of Goethe's *Farbenlehre*. The topic of colour occupies only a small fraction of his philosophy of nature<sup>1</sup> and a few albeit very beautiful passages in the *Lectures on Aesthetics*.<sup>2</sup> Nevertheless there are some great insights about the nature of colour and light in Hegel's philosophy.

I shall begin with a short history of the relationship between Hegel and Goethe. As I hope to show, the main principles which underlie Goethe's natural philosophy as expressed in the *Farbenlehre* can also be found in Hegel's and Schelling's natural philosophy. While my section on Schelling is brief and general, I shall demonstrate the more specific use of these principles in a close analysis of Hegel's notion of "entoptic colours" as a form of "Aufhebung" of the subject-object divide.

I shall conclude this chapter with a brief discussion of weak subjectivism in general, for even if Hegel and Schelling may be far removed from modern Anglo-American philosophy their views on colour are nevertheless weak subjectivist in a wide sense.

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<sup>1</sup> *Enzyklopädie der philosophischen Wissenschaften* (1830), §320

<sup>2</sup> *Vorlesungen über Ästhetik oder Philosophie der Kunst* (1820-1829), especially Part3, third section, first chapter: "Painting" (henceforth abbreviated as Part3, III, 1) in the passages about the "sensual material of painting" (1b and 2b).

# 1. Hegel, Goethe and Schelling

## 1.1. Goethe and Hegel

In his essay "Influences from Newer Philosophy"<sup>3</sup> Goethe thanks Kant and Herder, then Fichte, Schelling, Hegel, and the brothers Humboldt and Schlegel for their influence on his thoughts (note the omission of Schopenhauer). Considering that Goethe was not a friend of complex philosophical systems, especially when these are almost unreadable to a non-philosopher, it is surprising how close Goethe and Hegel were. Their letters to each other are hearty and witty, and according to their contemporaries they thought highly of each other and enjoyed each other's company.

Their work too shows some affinities. While some critics argue that Goethe only accepted Hegel because the latter supported his *Farbenlehre*, others speak of strong influences they had on each other.<sup>4</sup> From Eckermann<sup>5</sup> I have the impression that Goethe did not like Hegel's writings but admitted that this might be due to his lack of understanding of Hegel's philosophy; furthermore, that Goethe thought Hegel had a bad influence on students, in particular with regard to philosophical style; and thirdly, that Goethe thought it wrong to make religious issues part of philosophy. On the other hand, Goethe praised Hegel's judgments as a critic and, as I said, liked Hegel himself a lot.<sup>6</sup>

Goethe and Hegel share three strong beliefs: First, a general belief in progress and in the active role nature and especially we humans play in it. Secondly, both thinkers are holistic and try to explain the whole world by a few basic thoughts (in Hegel's case these turn into well thought out and very complex systems, in Goethe's they are distributed over essays, poetry, drama and fiction). Most importantly, however,

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<sup>3</sup> "Einwirkung der Neueren Philosophie", HA13, pp.25-29

<sup>4</sup> Falkenburg, Illetterati and Melica (all in Petry, 1993) come to the conclusion that Hegel adapted most of Goethe's *Farbenlehre* to his own thought. Honegger (1951) on the other hand, draws attention to the wider affinities between Goethe and Hegel regarding the relationship between nature and art, and Marotzki (1987) even sees strong parallels between the development of man in Goethe's *Faust* and in Hegel's *Phenomenology of Spirit*.

<sup>5</sup> Eckermann I,p.293; II,pp.71,129

<sup>6</sup> *ibid.* II,p.81; I,p.383

both Goethe and Hegel base their thoughts on the dynamic nature of polarities and their syntheses.

Unlike Schopenhauer Hegel does not dismiss Goethe's insights as "merely poetical" but is impressed by their philosophical importance, and perhaps Hegel achieves what Schopenhauer only claims to have achieved: He makes Goethe's *Farbenlehre* into a part of a philosophical system and thus philosophically vindicates Goethe's ideas. On 20th July 1817 Hegel writes to Goethe that he owes the correct understanding of the nature of light and of a great wealth of its appearances ("die richtige Erkenntnis der Natur des Lichts und eines weiten Reichtums seiner Erscheinungen") to Goethe, and that he admires the abstraction within the system with which Goethe held onto the basic truth ("Grundwahrheit" - "daß ich die Abstraction darin erkenne und bewundere").<sup>7</sup>

Goethe, of course, was delighted that Hegel took him seriously, especially as Hegel had become influential in Berlin and his support might at last spread the acknowledgement of the *Farbenlehre*. It turned out that Hegel was less successful than Goethe had hoped. Altogether he only recruited a few followers, one of whom, however, von Henning, gave a series of lectures on Goethe's *Farbenlehre* in Berlin (winter 1821/22), and these were much discussed among friends. After that the Akademie der Wissenschaften in Berlin financed a lecture on Goethe's *Farbenlehre* to be held at the University of Berlin every summer semester. In turn, Goethe published the (greater part of) a letter from Hegel about the Urphenomenon and entoptic colours in his *Hefte*<sup>8</sup>, and wrote to Boisseree:

"Since now the higher philosophy has vindicated the independence and indivisibility of light, we others have won the game and in our naivity can quietly work towards highest contemplations."<sup>9</sup>

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<sup>7</sup> Hegel, *Briefe*, pp.160 and 161

<sup>8</sup> Letter from 20.2.1821, in *Hefte zur Naturwissenschaft*, vol.I,4 (1.Band, 4. Heft).

<sup>9</sup> "Da nunmehr die höhere Philosophie dem Lichte seine Selbstständigkeit und Unzerlegbarkeit vindiziert, so haben wir Andern gewonnenes Spiel und können in unserer Naivität ganz gelassen den höchsten Betrachtungen vorarbeiten." (1.7.1817)

## 1.2. Goethe and Schelling

Already in 1800 (ten years before the publication of the *Farbenlehre*) Schelling wrote to Goethe that one could not proceed with nature studies "before this great and general phenomenon of nature is made clear" ("ehe dieses große und gemeine Phänomen der Natur ins reine gebracht ist").<sup>10</sup> In the same letter Schelling wrote that the completed *Farbenlehre* could serve as a schema for other natural phenomena, especially sound and music. What connects the two thinkers most, however, is their interest in magnetism. Goethe studied magnetism extensively in August and September 1799 and in March 1800. At about the same time, Schelling suggested to him to write a "theory of the earth" (i.e. prehistoric account) based on the principles of magnetism. Magnetism was then as much a key theory as the theory of relativity was at the beginning of this century and chaos theory was in the nineteen-eighties. Apparently this went as far as interpreting texts according to Schelling's theory of magnetism (an interesting early case of deconstruction).<sup>11</sup>

As with Schopenhauer and Hegel, the difference between Goethe and Schelling is that between realism and idealism. Thus Schiller writes to Goethe:

"It is an interesting phenomenon (*Erscheinung*) how your contemplative nature gets on so well with philosophy and is livened and strengthened by it; whether on the other hand, the speculative nature of our friend [Schelling] will acquire as much of your contemplative one is doubtful to me, and that is grounded in the nature of the thing itself. For you only take from his ideas what suits your contemplations and the rest does not disturb you as for you the object in the end remains a firmer authority than speculation is, as long as those two don't coincide. For the philosopher, however, any contemplation which does not fit in, is very inconvenient because it makes absolute demands on his ideas."<sup>12</sup>

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<sup>10</sup> *Briefe an Goethe*, HA1, p.342 (6.1.1800)

<sup>11</sup> Schiller writes to Goethe that in Schütz' critique of his *Jungfrau von Orleans* "one can find Schelling's theory of art applied to the text in a completely new fashion." ("man findet darin ganz frisch die Schellingische Kunstphilosophie auf das Werk angewendet." - (Letter from 20.1.1802). And Caroline (Schelling's future wife) writes: "[In Schütz' interpretation] the Jungfrau is constructed according to the principles of natural philosophy, and it is really a treatise occasioned by the Jungfrau, for there is very little of her in it, but much of potences, duplicity and identity, and even of magnets." (Darin ist die Jungfrau nach Prinzipien der Naturphilosophie konstruiert, und es ist eigentlich eine Abhandlung bei Gelegenheit der Jungfrau, denn es kommt so wenig von ihr darin vor, aber viel von Potenzen, von Duplizität und Identität, vom Magneten sogar." - (Caroline, 22.1.1802; both letter in *Briefe an Goethe*, HA1, No.255 and commentary)

<sup>12</sup> "Es ist eine interessante Erscheinung, wie sich Ihre anschauende Natur mit der Philosophie so gut verträgt und immer dadurch belebt und gestärkt wird; ob sich, umgekehrt, die spekulative Natur unseres Freundes [Schelling] ebensoviel von ihrer anschauenden aneignen wird, zweifle ich, und das liegt schon in der Sache. Denn Sie nehmen sich von seinen Ideen nur das, was Ihren Anschauungen zusagt, und das übrige beunruhigt

I do not know what brought the two men together and apart again (Goethe significantly influenced the authorities in support of Schelling attaining a professorship in Jena in 1798, but twenty years later (in 1816) he denied Schelling the very same post). But when Schelling tried to get into contact again in 1827 Goethe answered him a month later, pleased by Schelling's efforts:

"For since the early beginnings of [our] common development (Bildung) I have often looked at what you've been doing, from which I always received a friendly and happy inspiration."<sup>13</sup>

Philosophically, Goethe had probably more in common with Schelling than with Hegel. Between 1800 and 1830 at least both of them saw nature as primary in the ultimate (godly) identity of nature and human spirit. They may also both be attacked or admired for wishing to combine Platonism with Spinoza's philosophy.<sup>14</sup> It is certainly true with regard to Goethe that his holism (from Spinoza) sits somehow uneasily beside the eternal realm of Urphenomena. But as Schiller said, this did not bother Goethe at all, as long as he remained true to the phenomena themselves.

As I know more about Hegel than about Schelling I shall concentrate on the former throughout this chapter. I will however return to Schelling in my chapter on painting where I find Schelling's philosophy of Art (so successfully applied to Schiller's *Jungfrau*) very useful for the treatment of colour in painting.

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Sie nicht, da Ihnen am Ende doch das Objekt als eine festere Autorität dasteht als die Spekulation, solange diese mit jenem nicht zutrifft. Den Philosophen aber muß jede Anschauung, die er nicht unterbringen kann, sehr inkommodieren, weil er an seine Ideen eine absolute Forderung macht..." (*Briefe an Goethe*, HA1, no.257, 20.2.1802)

<sup>13</sup> "Denn seit den frühen Anfängen einer gemeinsamen Bildung sah ich mich gar oft nach Ihrem Tun und Treiben um, woraus ich jederzeit eine freundliche und glückliche Anregung erfuhr." (*Briefe an Goethe*, HA2, no.620 (22.9.1827) and commentary incl. Goethe's letter from 26.10.1827)

<sup>14</sup> Jacobi writes to Goethe that Schelling was combining Plato and Spinoza which was intrinsically impossible and could only lead to double-facedness ("Doppelzüngigkeit"). (*Briefe an Goethe*, HA1, no.346, 23.2.1808)

### 1.3. Goethe's Polarities

"We see on the one side the light, the bright, on the other the darkness, the dark; we bring turbidity between the two, and out of these opposites, with the help of the thought mediation, there develop, also in opposition, the colours; and yet they soon point, through inter-relations, immediately back to something common."<sup>15</sup>

From the first three sections of Goethe's *Farbenlehre* (physiological, physical and chemical colours) I have extracted the following principles:

1. In the beginning was Opposition
  - 1.1. The Polarity in Nature - real
  - 1.2. Phenomena and Appearances
  
2. Prime(Ur)-Knowledge is Knowledge of Urphenomena
  - 2.1. The Concept of Polarity - ideal
  - 2.2. Ideal Phenomena
  
3. From Opposition in opposition follows Unity
  - 3.1. Ideality and Reality
  
4. From Unification follows Separation
  - 4.1. Analysis and Synthesis
  
5. There follows an infinite Process of Becoming
  - 5.1. Polarity and Intensification

According to Goethe these principles give a complete account of all developments and movements in nature. Put into a system like this their proximity to Hegel's dialectic is

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<sup>15</sup> "Wir sehen auf der einen Seite das Licht, das Helle, auf der anderen die Finsternis, das Dunkle; wir bringen die Trübe zwischen beide, und aus diesen Gegensätzen, mit Hilfe gedachter Vermittlung, entwickeln sich, gleichfalls in einem Gegensatz, die Farben, deuten aber alsbald, durch einen Wechselbezug, unmittelbar auf ein Gemeinsames wieder zurück." (Fl.§175)

apparent. Even more striking is the affinity to Schelling, whose natural philosophy deduces all formations and movements from magnetism, which is naturally the most obvious manifestation of polarity in nature. In the following pages I shall give a detailed analysis of each principle in order to show that these principles are no mere formulae ("sterile receptacles") but are useful ideas for the understanding of colour and colour relations.

## 2. Goethe's and Hegel's Principles in Detail

### 1. In the beginning was Opposition

Opposition is the principle which governs everything. It is in the beginning in the sense of "ἀρχή", "principium", or "ur". Within oppositions one side may be regarded as positive and the other side as its negation. Thus light might be conceived as the positive force and darkness as its negation.<sup>16</sup> Goethe has a clearly optimistic view of this initial opposition leading to a positive end much like Hegel's synthesis improving over thesis and antithesis. At the same time opposition keeps us alive in the sense that we can never become lazy if we do not want the negative side (nothing/death) to take over (see also below: 5). Goethe's dialectic like Hegel's is therefore also a historical thesis.

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<sup>16</sup> Please note how wonderfully systems like these can be deconstructed by changing the values of the forces. Thus Mephistopheles takes darkness to be the primary force:  
"Ich bin ein Teil des Teils, der anfangs alles war,  
Ein Teil der Finsternis, die sich das Licht gebahr,  
Das stolze Licht, das nun der Mutter Nacht  
Den alten Rang, den Raum ihr streitig macht,  
..." (Faust I, lines 1349-52)

### 1.1.Polarity in Nature - real

The principle of opposition exists in nature as real forms of polarity - for the Farbenlehre these are of course light and darkness. Polarities of time and space (up and down, here and there, before and after, etc.) determine nature's movements (attraction and repulsion, appearing and disappearing light, acids and alkalines, acting and suffering, male and female, etc.) and interact with the polarities of colours and light and darkness. There are no isolated polarities.

As for Hegel, Goethe and Schelling ideality and reality (God/spirit/mind and nature) are ultimately one it is not only "natural" but necessary that nature partakes of opposition and polarity if that is the governing principle. While Schelling and Goethe take ideal polarity to stem from (or be given by) nature, Hegel on the other hand takes nature to be the product of spirit. All three agree that polarity exists in nature in the sense that it can be discovered empirically.

### 1.2.Phenomena and Appearances<sup>17</sup>

According to Goethe, each manifestation of one or several polarities is an appearance. Appearances thus make their underlying principles - the phenomena - perceptible to sense-organs. The most fundamental phenomenon is the "Urphenomenon". One such Urphenomenon is the polarity between light and darkness which governs and can thus be grasped in all colour phenomena.<sup>18</sup>

The appearance of colour itself is in Hegel a synthesis of light and darkness (as in Goethe between light and turbidity). As light and darkness/matter for Hegel represent subjectivity and objectivity, colours are additionally a synthesis of subjectivity and

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<sup>17</sup> "Appearance" is the best translation for "Erscheinung" in Goethe, but as I said above (footnote 18, p.20) the emphasis is on the appearing of phenomena, not on the contrast between appearance and reality, as the appearances alone make reality visible.

<sup>18</sup> Polarity itself cannot be the main Urphenomenon because it is too abstract a term: unlike Urphenomena it cannot be apprehended in appearances but only abstracted from them. Polarity is thus the form which all Urphenomena have in common.

objectivity and hence manifestations of the highest principles of all (see ch.VI for details).

## 2. Prime Knowledge is Knowledge of Urphenomena

It follows that the most fundamental insight into nature is the recognition of an Urphenomenon. Once we have grasped "what holds the world together in its innermost being"<sup>19</sup> we can deduce other phenomena. While Schelling might completely agree with Goethe on this matter, Hegel will give the same thought a different interpretation: as for Hegel it is absolute spirit which holds the world together and enables us to understand, we need to deduce from spirit rather than from nature. One could also argue that Hegel's point repeats Goethe's albeit on a higher level: Goethe's ascending from empirical phenomena to Urphenomena is reflected in Hegel's advance from empirical certainty to the knowledge of absolute spirit (as outlined in the *Phenomenology of Spirit*).

What Hegel, Goethe and Schelling have in common is their holism: if truth is always the whole truth then the grasping of its most obvious expression - be it magnetism, colour or whatever - will automatically yield insight into all other processes. Hence the three thinkers agree in the general method for investigation as aiming to understand the highest principle in order to descend from it to explain lower principles.

### 2.1. The Concept of Polarity - ideal

Corresponding to the real polarity in nature we have the concept of polarity in our minds. Here Goethe, Schelling and Hegel again set different priorities: For Goethe and Schelling the concept of polarity is given to us by nature (through our being part of nature (Natur)) while for Hegel our concept of polarity is given by the nature (Wesen)<sup>20</sup>

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<sup>19</sup> "was die Welt/Im Innersten zusammenhält" (*Faust*, lines 382-3)

<sup>20</sup> See appendix for an explanation of "Wesen" and "Natur".

of absolute spirit. Logically it makes no difference which of the two stances we adopt as long as we accept the ultimate unity of nature and spirit which makes the polarities in nature and in our conceptual understanding deducible from each other.

## 2.2. Ideal Phenomena

Accordingly we also possess the concept of "phenomenon". This follows from two facts given so far: First, as any phenomenon encompasses polarity, the grasping of polarity as demonstrated above is always the grasping of a particular polarity and hence of a phenomenon. Secondly, our concepts of phenomena are entailed in there being real phenomena in nature because (due to the original unity of nature and spirit) they each have their own equivalents in spirit, i.e. potentially in our minds.

How we grasp these ideal phenomena and polarities is another matter, for even if ideal (spiritual) and real (empirical) phenomena exist in parallel (or unity) it does not follow that everyone can apprehend them. With regard to Goethe I give a Schopenhauerian-Platonic account of the process of grasping phenomena (ch.V), but otherwise I shall leave this question unanswered and merely discuss the ontological problems involved.

## 3. From Opposition to opposition follows Unity

The principle of opposition leads to a paradox: the opposite of opposition is unity. As we shall see in my chapter on painting, one can thus explain why pictures composed of certain combinations of colour, which are themselves opposite (complementary) to each other, can yet have harmonious effects on us. The interaction of opposition and unity is thus an essential part of our understanding of harmony, be it in music, in painting or in human relations.

### 3.1. Ideality and Reality

Important oppositions are thus united: real objective polarity in nature is set against ideal subjective polarity in the human mind. The recognition of this parallel or unity alone is one way of uniting the two sides as we make them two corresponding sides of the one world picture or statement. A less conscious unity is achieved in the process of colour vision, as our eyes complement the objective colours in nature with subjective physiological colours.

Hegel and Schelling expand this point further as they make colour the unity of ideal light and real matter. The process of seeing colour is thus a "double synthesis" of the two syntheses of colour outside us (light and matter) and colour activity within us (complementary production of dark and light in our eyes/minds). Once we understand this we can return to the individual syntheses and deduce why colour as we see it is "out-of-itself": it is split into two halves each of which contains ideality (light) and reality (darkness/matter).<sup>21</sup>

### 4. From unification follows separation

The second paradox contained in the concept of polarity is that unity not only opposes polarity but by its very nature strives to become one with it, i.e. to unite with it. Thus two united sides will strive back towards opposition.

Both, the unity out of opposition and the separation out of unity may seem to be rather abstract constructions or even empty wordgames, as both points stem from the fact that opposition includes the possibility of opposition to opposition, which leads to the same kind of paradox as Russell's classes of classes. Nevertheless these cases occur in real life, as for instance in political situations when members of the opposition oppose their own party's politics and thus back the government. Similarly, the constant striving towards unity includes the possibility of unity with opposing forces, as happens when someone who tries to be friendly towards everyone (i.e. to unite with everyone) is torn into different directions.

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<sup>21</sup> See chapter VI for details on the relation between light and dark, ideality and matter.

In the case of colour both effects can be seen in colour combinations: while some rather different colours can look harmonious when seen together, colours which are closer to each other may repel each other (we say, "they clash"). Both effects are useful for painting and will be discussed in the relevant chapter (ch.X; but for anyone curious, the colour examples are in section X,2).

#### 4.1. Synthesis and Analysis

To grasp the interaction of polarities in unity and opposition two techniques are required: analysis will render differences while synthesis will strive to unite them. As analysis and synthesis are themselves a form of polarity the process of investigation can be the same as that of the investigated.

To match the process of investigation to its object is not merely an elegant method, but in the case of Hegel, Goethe and Schelling becomes a necessary requirement if their fundamental thesis of the unity of nature and spirit is to hold.<sup>22</sup>

#### 5. There follows an infinite Process of Becoming

The movement between polarities is infinite. As one side increases or decreases it changes the balance of polarities thus demanding its opposite side to decrease or increase respectively. Because all polarities are connected (see 1.1) the effect of a slight change in one polarity can be vast (much like the famous movement of a butterfly in China affecting the weather in Scotland). Whatever is part of this process of becoming is not part of living nature - it is dead.

Although the thought that living nature is in constant movement between polarities is especially strong in the more lyrical passages in Goethe and Schelling, I do not regard it merely as a romantic metaphor. We do live by constantly striving towards different goals, which we abandon as soon as we have reached them only to return to

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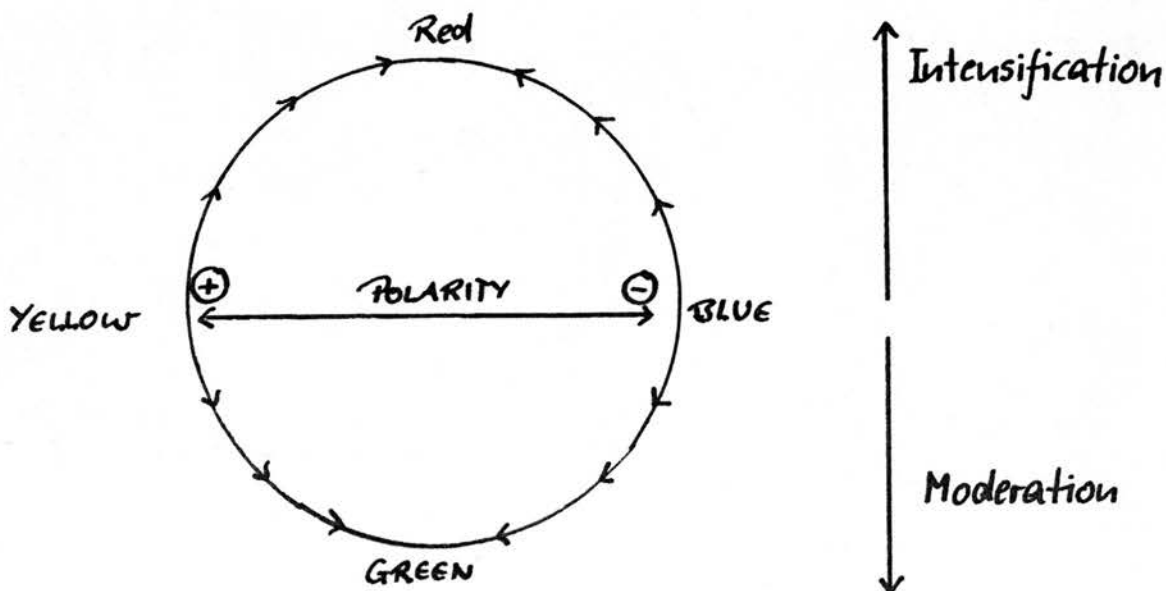
<sup>22</sup> Please note that their method could further be understood by yet a higher level of synthesis and analysis comprising method as well as object of their investigation.

them again later on (as for instance, in the circle from drinking, hangover and drinking again - a clear case of attraction to and feeling repelled by the same thing). The only time we ever stop to strive is when we are dead, for even in sleep we wish for rest and after sufficient rest wish to rise again.<sup>23</sup>

### 5.1. Polarity and Intensification

It can now be seen that two principles are needed to explain all phenomena: Polarity must be supplemented by intensification (*Steigerung*) to account for movement or change. Thus intensification is the life force or energy of nature. As either opposition or unity are intensified the two polar principles form a circle (rather than a line).

We thus arrive not just at a multitude of polarities but also at different degrees of their intensities. This again is a natural occurrence as at different moments in life different things appear to be the most important ("the most attractive"). With regard to colour (disregarding lightness) the two forces of polarity and intensification form the first basic colour circle. As I shall show in chapter VII this circle can be modified in many different ways, but its basic formula remains the same: polarity and intensification.



<sup>23</sup> Please note that this Faustian striving as essential human nature is a Western European idea. Strongly fatalistic societies as well as Buddhist, Zen and many other Eastern philosophies will not treat standing still as death but as either inevitable or as a desirable goal in life.

### 3. Hegel's Principles.

The principles which underlie Hegel's philosophy of colour are not as easy to summarise as Goethe's are. The sections of the *Encyclopaedia* devoted to light are almost unintelligible without a basic understanding of the *Encyclopedia* as a whole. Hegel's earlier *Wissenschaft der Logik* (1812-16) contains a key passage on unity and polarity which is repeated in his later writings on light, reflection and colour,<sup>24</sup> but I shall try to stick to the "Logic" as given in his *Encyclopaedia* (1830), since here we may assume consistency with Hegel's philosophy of nature. Amazingly, however, more than consistency connects Hegel's logic and his philosophy of nature: We can understand Hegel's theory of light and colour by merely reading his logic and exchanging some of its terms with terms from the latter (which might explain why Hegel spends so little time explaining light and colour in his philosophy of nature section of the *Encyclopedia*).

#### 3.1. The theory of being - the theory of light

"*Pure Being* makes the beginning because it is both pure thought and the indetermined, simple immediate; and the first beginning cannot be something mediated and further determined."<sup>25</sup>

Thus the Absolute Being is abstracted from all limitations of reality (Enc.§86) and as pure abstraction captures even the absolutely-negative. As we shall see in my chapter on light, light-in-itself (as I call it) is also absolutely pure, indetermined and simple, as well as absolute identity ("I") and hence beginning. It is thus the entity closest to God. Everything else is darker and less pure than light - is its true other. As the negative of light (itself positivity) its other is empty, is nothing within itself (i.e. not identity, beginning or "I").

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<sup>24</sup> *Logik*, "Lehre vom Begriff", Subjectivität, pp.43-52.

<sup>25</sup> "Das *reine Sein* macht den Anfang, weil es sowohl reiner Gedanke als das unbestimmte, einfache Unmittelbare ist, der erste Anfang aber nichts Vermitteltes und weiter Bestimmtes sein kann." (Enc.§86). See chapter VI for a detailed analysis of these predicates regarding light.

Light and dark are, however, meaningful polarities: dark is not just the negative of light and vice versa but each is a force in itself. Thus on the one hand light and dark are determined by each other but on the other they have independent natures (Wesen). A Wesen is the shining (Erscheinung) of Sein, i.e. appearing essence. And each Wesen is not just different from any other Wesen but has its own particular other (Enc.§119). Thus light is not just different from house and you and me, but is particularly opposed to darkness. This gives it a particular force. In the case of colour, the particular forces of light and dark meet and become visible in the production of colour. The opposition between light and dark is therefore not a mere logical contradiction such as blue and not-blue, but forms affirmed opposites (such as blue and yellow).

### 3.2. Colours as a Process of Becoming

Just as becoming is the synthesis of being and nothingness, so colour is the synthesis of light and dark: anything becoming includes being and nothingness as it comes into being yet thereby loses its former qualities ("has nothing of them"); similarly colours are a process of becoming between light and dark, sometimes closer to light sometimes closer to dark but always in time as "fleeting appearances". Just as becoming is not a restful unity of being and nothingness but is restless in its containing the two polarities and being torn between them, so colour too continually strives towards the lighter or darker and never appears to be absolutely still.

This lack of stillness refers both to colour permanency and to the restfulness of colour at any moment in time. While the latter depends on visual context (such as the shimmering and flickering effect of certain patterns),<sup>26</sup> the former is related to the kind of colour in question. Pillarboxes, for instance, remain red for many years, while rainbows and after-images disappear within minutes or even seconds. Hegel therefore adopts Goethe's distinction between physiological, physical and chemical colours. Colours which are relatively permanent, such as the redness of a pillarbox, are what Goethe calls "chemical colours". Hegel explains these colours as qualities of physical

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<sup>26</sup> See also chapter X, sect.2, where I discuss which colours repel each other and hence cause effects of instability.

objects (of "something"). The matter of that something determines the "Dasein" (Being there) of its colour. And indeed colours are determined by the chemistry of the objects they are colours of, so that the longer lasting the chemical structures in a dye or paint are the longer lasting is its colour.

According to Hegel, chemical colours are however the exception to the rule and do not show the true nature (Wesen) of colour. Already in his *Logic* (1812-16) Hegel uses colour as an example for the relationship between the general and the specific idea:

"[It may seem natural and sensible to observe colour] first in the concrete appearance of the subjective animal sense [physiological colours], then as being a ghostlike floating appearance external to the subject [physical colours], and lastly as fixed to objects in external reality [chemical colours]."<sup>27</sup>

Hegel continues that it is the second form which is the general (and in that sense first) form of colour, where

"colour sits in balance between subjectivity and objectivity in the form of the familiar spectrum, still without any involvement with subjective or objective circumstances."<sup>28</sup>

It is thus colour as holding the balance between subject and object and hence as their bridge (in that sense unity) which catches Hegel's interest. For it is this kind of colour which reflects most clearly the process of becoming between polarities: both, between light and darkness (being and nothingness) and between subject and object. Physical colours thus bridge the conceptual gap between two major polarities in Hegel's philosophy.

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<sup>27</sup> "...so könnte es als naturgemäß und sinnreich erscheinen, die Farbe zuerst in der concreten Erscheinung des animalischen subjectiven Sinnes, alsdenn ausser dem Subject als eine gespenstartige, schwebende Erscheinung, und endlich in äusserlicher Wirklichkeit an Objecten fixiert zu betrachten." (*Logik*, vol.II, "Lehre vom Begriff: Idee", p.217)

<sup>28</sup> "...wie die Farbe auf der Schweben zwischen der Subjectivität und Objectivität als das bekannte Spectrum steht, noch ohne alle Verwicklung mit subjectiven und objectiven Umständen." (*ibid.*)

### 3.3. Physical Colours: An Undecided Problem

Hegel's general description of colour as a "ghostlike floating appearance external to the subject" corresponds to Goethe's class of "physical colours". These are colours which appear through the interaction of light with non-coloured "turbid" media, such as mirrors, metals, water, crystals, and most famously: prisms. In trying to explain how colours can appear from non-coloured causes one has two possibilities: one can either assume that light is not as simple as it looks but already contains colours which are therefore *discovered* under certain conditions; or one can hold on to the notion of light being simple and argue that colours are *created* under certain conditions. Malus, Newton and their followers chose the first option, while Goethe, Hegel and Schelling chose the second one.<sup>29</sup>

In the early nineteenth century this issue was not yet decided, and Goethe and his contemporaries were correct in drawing attention to the fact that Newton's experiments were by no means conclusive.<sup>30</sup> The weakness of the theories of Newton and Malus is that they ignore the angles of reflection or refraction in their account, although with most angles the colours actually do not appear. So although we now know that Newton's theory is correct within our scientific framework, it was pure hypothesis at the time, and, as I hope to show, can be seen as insufficient or even false in different frameworks.

In order to defend the explanations given by Goethe, Hegel and Schelling one has to show how their theories explain the appearance of colour from non-coloured causes better than or at least as well as Newton does in his theory. The explanation of the creation of colour "out of nothing" is easier than might appear if one accepts these philosophers' treatment of nature as a whole: As in organic nature living beings (plants and animals) are created out of the in-themselves fairly insignificant pollen/seed and eggs, there is no reason why the same could not also happen in inorganic nature. Thus in chemistry the mixing of two or more substances can yield different and far more

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<sup>29</sup> Schopenhauer too speaks of the creation of colour but in a different, subjective sense.

<sup>30</sup> See also the excellent paper by Friedrich Steinle, "Newton's Rejection of the Modification Theory of Colour", in Petry (1993), pp.547-556.

powerful substances (such as explosives),<sup>31</sup> and in optics relatively dull daylight meeting an ordinary piece of glass can result in the most beautiful of colour.

In the case of physical colours, colour is created by the interaction of light and a turbid medium. The conditions for the appearance of colour furthermore include the angles between surfaces of the turbid medium, the light source (or sources) and the perceiver. While these combinations can be fairly complex in some cases I hope to show that the explanation as a whole is a good one, if we want to remain within the realm of visible appearances rather than refer to processes or entities such as lightwaves which themselves are invisible.

#### 3.4. Entoptic Colours in Particular

In order to understand Hegel's philosophy of colour it is easiest to concentrate on entoptic colours. The treatment of entoptic colours in Goethe's *Farbenlehre* was published eight years later than the main text in *Hefte zur Naturwissenschaft* (I,3,1820) which Goethe introduces by thanking Hegel, Seebeck and others for their help in the discovery of these phenomena. Goethe also suggests to include the resulting 40 odd pages on entoptic colours in his *Farbenlehre* after §485, i.e. at the end of the section on physical colours. Although not structured into short paragraphs these pages consist of 28 short sections and stylistically as well as thematically fit seamlessly into the main work of the *Farbenlehre*.

As their name suggests, entoptic colours are colour appearances *within* a medium. They were first investigated by Malus and others in 1809 and then more closely examined by Seebeck in Germany and Brewster in England (who received a joint science prize for their discoveries). Hegel took part in some of Seebeck's experiments during his time in Nürnberg. Whether Hegel actually coined the term "entoptic colours", as seems to be implied in some of the letters between Goethe and Hegel, is not quite clear.<sup>32</sup> In any case Goethe is clearly grateful for Hegel's

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<sup>31</sup> Goethe's interest in alchemy must have also supported the belief in creation from fairly insignificant parts, such as the quest for the "Stein der Weisen" showed, which was believed to create gold out of dirt.

<sup>32</sup> On 20.7.1817 Hegel writes to Goethe that he is pleased about Goethe's accepting his term ("ein Name, den ich mich freue, daß Sie ihn, wie ich ihn dem epoptischen nachgräzisiert habe, gelten lassen."). Also there

contribution to his understanding of entoptic colours for he writes to Reinhard and Schultz that Hegel had penetrated ("penetriert", "durchdrungen") the subject of entoptic colours to such an extent that Goethe now found his own writings more transparent (durchsichtig) than before.<sup>33</sup>

Entoptic colours were first discovered in calcites but were later found to be reproducible (lifted to the status of empirical phenomena) in pieces of glass.<sup>34</sup> The thick, transparent medium is held towards the north light in such a way that its two sides reflect the light within the medium showing four dark corners ("the white cross"; if the medium is more or less square, in the triangle we obtain three dark corners). With the help of further mirrors and/or backgrounds colours can be produced. The details are rather laborious but what is important is that

1. entoptic colours appear through double reflection;
2. entoptic colours appear within an otherwise colourless transparent medium.

In order to understand Hegel's notion of entoptic colours we therefore first have to understand the relevance of reflection: The nature of simple reflection is to reverse left and right.<sup>35</sup> A mirror, if not perfectly plane or looked at from a right angle will furthermore emphasise some features over others by changing the quantitative relations of the object reflected.

Now, light according to Hegel *is* reflection-in-itself: as absolute identity with itself it travels in a straight line and is reflected in a straight line. Perfect reflection would thus reflect the light back to its original source from which it would again travel to be reflected and so on ad infinitum (see chapter VI for details).

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are several references to Hegel's "godfathering" (Gevatternschaft) of the entoptic colours, which Goethe however excludes from the reprinting of Hegel's letter (24.1.1921) in his *Naturwissenschaftliche Hefte*. For on the other hand, Seebeck claims to have named them himself ("..welche ich später entoptische genannt habe.."; *Naturwissenschaftliche Hefte* I.1 (1817) p.11).

<sup>33</sup> "...dieser wundersam scharf und fein denkende Mann...Bei Gelegenheit des entoptischen Aufsatzes hat er sich so durchdringend geäußert, daß mir nun meine Arbeit durchsichtiger als vorher vorkommt." (to Reinhard, 5.3.1821)

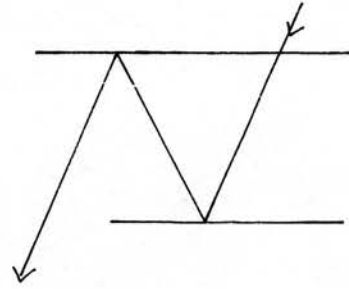
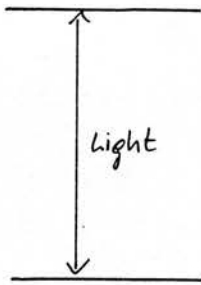
"Dieser merkwürdige geistreiche Mann hat, wie meine Chroagenesie überhaupt, so auch dieses Kapitel dergestalt penetriert, daß meine Arbeit mir nun selbst erst recht durchsichtig geworden." (to C.L.F.Schultz, 10.3.1821)

(both reprinted in *Hegels Briefe*, commentary p.475).

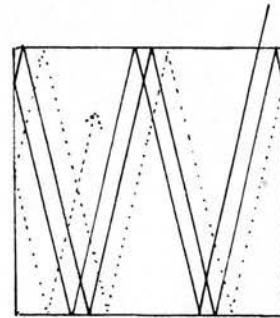
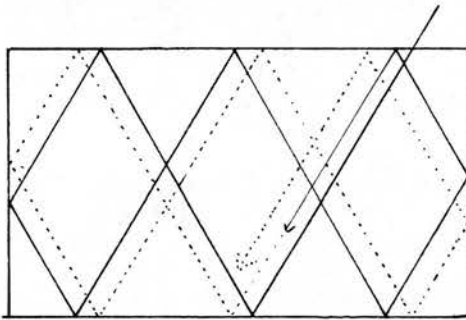
<sup>34</sup> Goethe's note on how to prepare the glass no longer applies as most of our 20th century glass is produced that way anyway.

<sup>35</sup> See J.W.Burbridge for an analysis of Hegel's concept of reflection as reversal as used in his logic; in Beiser (1993), pp.97-8.

If we however change the angles of the mirror, the light will be reflected to a place unlike its origin, and a parallel double reflection will more or less continue the original direction of the light :



In the case of entoptic colours this double reflection takes place within a transparent medium where the light will partly be transmitted and partly be reflected.<sup>36</sup> Ignoring the transmittance of light, some of the internal reflection will be infinite:



What we therefore see in entoptic colours is an infinite changing of ideal polarities (of direction) creating colour within real matter. The intensity and specific colour of entoptic colours depends on the following conditions:

- a) purity (ideality) of light: the experiments have to be performed under a clear blue sky, i.e. without manifestations of darkness as in material clouds;
- b) direction of light: the appearance changes from a white cross (Northern light) to a black cross (Southern light) depending on the direction we are facing; each cross is thus in a sense a further reversal (mirror image) of light and darkness;

<sup>36</sup> As I explain in chapter VII no empirical object is perfectly transparent, so that even the transparent medium referred to in this section will reflect some of the light incident upon it - both externally and internally.

c) addition of mirrors and surfaces within the medium:<sup>37</sup> further reflections, both internal and external to the medium, intensify the colours seen - from black and white crosses to colourful ones on backgrounds of their complementaries;

d) impurity of the medium: as impurity contributes more matter it further intensifies the colour<sup>38</sup> (presumably there is an ideal balance between the degrees of purity of light and impurity of the medium for each colour appearance).

We can now see why Hegel was so fascinated by entoptic colours: They are the result of genuine interaction between reality (material medium) and ideality (immaterial light), which is enhanced through the number of reflections internal and external to the medium to yield different colours. Entoptic colours are thus a way of capturing the "ghostlike fleeting appearance" while at the same time (through the complexity of the spatial relations required) emphasising the fragile balance of this interaction of light and dark. Unlike chemical colours, which remain more or less the same object under different circumstances, and unlike physiological colours, which are clearly subjective, entoptic colours can thus capture the subtle balance between ideality and reality which Hegel requires for his philosophy. Especially his explanation and evaluation of painting as expressing ideality (emotion, beauty, and most importantly religion and truth) although being itself material, can now be made to rest on the nature of colour itself (see chapter X).

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<sup>37</sup> Goethe suggests using several layers of plane glass on top of each other rather than one uniform cube to intensify the colours.

<sup>38</sup> Hegel calls this impurity "Sprödigkeit" ("brittleness") and names it as one of the opposites of ideality in his philosophy of nature (see for instance Enc.§320); for Goethe the impurity is of course the degree of turbidity.

## 4. Weak Subjectivism

There is no current strand in Anglo-American philosophy that reflects Hegel's or Schelling's philosophy. However, if we concentrate on their treatment of colour as a bridge or unity between subject and object and hence neither fully objective nor fully subjective, we reach weak subjectivism. In this section I shall argue that although most weak subjectivist accounts fail, they do capture the essential quality of colour being both subjective and objective in some sense or another.

Weak subjectivism allows for the possibility of determinate physical causes of colour appearances but treats colour itself as a sensation, more like pain than like shape. Most weak subjectivists therefore support the Lockean distinction between primary and secondary qualities, even if many of them slightly modify it. Weak subjectivists are thus often dispositionalists who argue that there are objective dispositions in objects and perceivers which cause colour sensations. These sensations tell us nothing about their physical causes, which are the subject of the natural sciences. I take it to be an advantage of the weak subjectivist position that it can accommodate any scientific account and can thus proceed independently of the sciences. The relationship of primary to secondary qualities can be one of epiphenomenalism (Jackson), representation by sense-data (Peacocke) or simply of no interest to the enquiry at all.

### 4.1. Three Arguments for Weak Subjectivism

Weak subjectivists share some arguments with objectivists and some with strong subjectivists; I shall only repeat three of them here, but express them in terms of the primary-secondary quality distinction:

1. Colours do not reveal anything about the primary qualities of an object and therefore are not physical qualities but are essentially subjective.

This claim is clearly wrong. While colour admittedly only seldom reveals the solidity of an object (but a green tomato is more solid than a red one), it does reveal all other

primary qualities, and is possibly the most revealing of all senses: if colour did not reveal extension, shape, number and motion of an object (to name Locke's primary qualities) we would see films as mere moving patches of colour, and even these would have determinate shape, number, size and motion. (I shall argue more extensively for the epistemic role of colour in my chapter on painting).

## 2. Colours like all secondary qualities are causally inactive.

This too is false. Colour does, for instance, interact with temperature as dark surfaces are warmer than light surfaces are. This alone is neither an argument for subjectivism nor one for objectivism, as we can either argue that this interaction is due to underlying causes common to both temperature and colour, or that it is specific to colour. Either way, however, the claim that colour is causally inactive is false.

When philosophers argue that size and weight are causally more active than colour, they adopt a Newtonian framework in which causality is defined as causing motion in particles.<sup>39</sup> In other frameworks this might be less significant. Biologists for instance might say that colour is causally more active than shape or size are because of the signalling role it plays in the recognition of food, mates, predators etc. I see no reason for favouring one framework over the other: while in some situations shapes and sizes are causally more important (as in carpentry, engineering, cooking, etc.), in others colours are more important (as in traffic, decoration, etc.). If someone objected that my examples show that colours usually interact with observers rather than with other qualities, I have to admit that this is true to a degree though not totally (as the interaction of colour with heat shows). If we include photosynthesis and other colour-intensive biological reactions in our framework, the difference in causal activity between colour and primary qualities diminishes even further. More importantly perhaps, I do not see why the interaction with shapes and sizes should be of greater importance than that with living perceivers. It is a mystery to me why so many philosophers take physics rather than say, biochemistry as their model for causal interaction, a mystery which I can only explain historically through Newton's influence.

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<sup>39</sup> See for instance, J.Bennett, "Substance, Reality and Primary Qualities", 1965.

### 3. Being coloured depends on looking coloured.

This is by far the most frequently used argument provided by weak subjectivists, and it deserves closer examination. It is true that the coloured objects around us and especially the spectrum itself reveal nothing about the structure of colour and can thus not be a sufficient explanation for our colour concepts. It is hence in some sense true that the determinate colour of a thing depends on how it looks *to us* (and not how it looks to bees or under a microscope). But we cannot make this fact into an ontological claim, for if we make colours ontologically dependent on how they look to perceivers, we run into Berkeley's problem of having to explain how all these looks match over time and space, so that my room, for instance, always looks the same when I return to it.

Especially if we want to reject the idea that colour requires a non-coloured physical formula which explains its objectivity<sup>40</sup> and yet want to say that pillarboxes are red whether or not someone is looking at them, we need to find out what it means to say that being red *depends* on looking red. We thus need to reconcile the following statements:

1. Being red depends on looking red (which is possibly the only criterion we have for something being red).
2. There is a difference between real colours and colour illusions.
3. An object remains the colour it is when no-one is looking at it.

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<sup>40</sup> Weak subjectivists, especially if basing their theory on Locke, do not deny that there are or could be objective primary causes such as lightwaves, which determine how an object looks.

## 4.2. The disjunctive solution

One of the most common solutions is to combine these statements in a disjunctive account such as:

"X is red if and only if it looks red to normal observers under normal conditions."

This disjunction still takes looking red as the criterion for something being red (1), but specifies conditions to distinguish real or typical colours from exceptions such as hallucinations (2). These conditions also entail that an object can be red without anyone looking at it (3), as long as it *would* look red if someone *did* look at it.

But there are some strong objections to disjunctive accounts. I shall only give a short overview over the arguments, even if I have to simplify both sides of the argument significantly.<sup>41</sup>

### a) Normal Conditions

Normal conditions vary according to the kind of colour: to judge the colour of a light, for instance, we need dark surroundings which are unsuitable for judgments of most other kinds of colour. Instead we should therefore speak of ideal conditions for different types of colour.

### b) Ideal Conditions

Ideal conditions, however, are often so contrived that most people never come across colour in these conditions at all.<sup>42</sup> Yet we are perfectly capable of judging colour in most (non ideal) conditions.

### c) Observers

The same objections hold with regard to ideal or normal observers. Ideal observers are the exception: colour-vision varies significantly from one person to the next and even within one person at different times. Thus even if we leave aside people with genuinely

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<sup>41</sup> For more detailed criticism see Hacker (1987), pp.127-129; Thompson (1995), pp.118-121; Hardin (1989), pp.67-82.

<sup>42</sup> Thompson quotes one such experimental setup from Boynton (1978) (Thompson, 1995, p.119)

abnormal or deficient colour vision, ideal observers constitute only about 4% of the population and all other "normal" observers will vary in their colour judgments. These statistics are based on judgments about borderline cases. The established ideal observers are consistent in their colour judgments while the vast majority of participants call the same colour green at one time and yellow at another. While we might therefore employ an ideal observer as expert to decide borderline cases (see next point) the notion is unlikely to explain most colour judgments.

Normal observers, on the other hand, are, perhaps paradoxically, those people who always agree that pillarboxes are red, but who usually disagree whether a shade of lime is yellow or green. The dispositionalist therefore needs to say that "X is red if and only if it looks red under certain conditions; and Y is lime if and only if it looks either yellow or green to a normal observer under normal conditions."

And here we begin to see that the number of our colour concepts make a difference to our judgment. If we have the concept "lime" then the lime syrup looks lime coloured. If we have only one concept for both yellow and green<sup>43</sup> then it looks that "yellow&green" colour. Lastly, if we have concepts for yellow and green but not a concept for lime then it is either "yellow" or "green" - and this indeed is the situation we usually find ourselves in when discussing these matters. (If you doubt this point try to find a group of people to agree what "puce" looks like.)<sup>44</sup>

If we now return to the subjectivist claim that something *is* of a certain colour only if it *looks* that colour, we find that the same object must have different colours if it looks different colours at the same time (yellow, green or lime, for instance). This, however, is not only absurd, but raises the question of how these colour concepts are learnt in the first place if they ultimately rest not on what colour an object is but on what it looks to us (why then, for instance, the difficulties colour-blind people have with colour terminology?)<sup>45</sup>.

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<sup>43</sup> See Berlin and Kay (1969): A language with only four colour concepts usually consists of concepts for black (dark, often including blue and possibly dark green), white (often including yellow), red and then either green or yellow.

<sup>44</sup> Incidentally, "puce" translates into German as "flohbraun" ("fleabrown") which is not very helpful.

<sup>45</sup> See chapter IX for details

#### d) Expert Solution

One possible solution is to discard objections b and c and to employ some experts (from the 4% minority) to judge colours under laboratory conditions and thus to fix colour terms. This may indeed be a practical solution for the definition of specific colour terms, but it does not solve the problem of what colour is. At best this solution leads to the statement that "X is red if and only if our experts judge it to be red under ideal conditions." General colour terms such as red, however, are not fixed by experts (though more subtle colour terms are). Thus this solution might be a way of establishing new colour vocabulary but it does not describe or explain what is actually the case.

### 4.3. Ultimate Failure of Dependence on Looks

There is a deep conceptual problem which undermines dispositionalist accounts: What does "being red" mean? If it *means* looking red then we cannot distinguish between genuine red objects and illusory red objects, for then anything that looks red is red (so we would have to drop premiss 2). If it means looking red under normal conditions, however, then we need to ask how these conditions are to be specified without reference to the object *being* red. We cannot specify normal conditions without reference to the object being red, for something appears a certain colour under normal conditions if and only if it appears as the colour it really is (that is to say, if the conditions do not change the colour it really is). The colour it really is, however, can only be seen under normal conditions, and thus this definition is circular.

It is the word "really" that gives the game away: we need to assume a true (objective!) colour of an object or we cannot specify any conditions with reference to it.<sup>46</sup> The same is true with regard to observers. While we are aware of slight differences in colour judgments among normal observers the term "normal observer" only makes sense if such an observer recognises clear cases of colour (such as the red of pillarboxes). As I shall argue in chapter IX we can only make sense of our colour

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<sup>46</sup> See also Hacker (1987), p.127.

concepts if we take colours to exist independently of us. Thus I shall have to reverse the statement of the weak subjectivist to saying: "X looks red to normal observers under normal conditions if and only if X is red."

#### 4.4. Conclusion

Weak subjectivism points to the importance of the perceiving subject much as Hegel's philosophy does. While I do not believe most modern weak subjectivist accounts to be successful<sup>47</sup> I do think that they express the correct intuition that colour partakes of both subjectivity and objectivity. So what I want to keep from weak subjectivism is the *epistemological* claim that we know colours from looking at them. Yet this claim is neither sufficient for knowing what colour something is, nor does it have any consequences for the ontology of colour.

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<sup>47</sup> I must admit that I have not read many contemporary accounts of weak subjectivism. But it seems to me that most of them try to save the phenomenal qualities of colour within essentially quantitative philosophical frameworks - be they based on logical relations or on scientific truths.

## IV

### WITTGENSTEIN: COLOURS AS REAL OBJECTS

Colours as objective properties or entities can be objective in an ideal sense or in a real sense. I have therefore divided the topic of objective colours into two chapters, the latter of which deals with ideal colours and colour relations in metaphysical realms. First, however, I shall discuss real objective colours - "chemical colours" as Goethe calls them. Assuming that there are colours in the real world which exist independently from observers, we arrive at some interesting epistemological questions about what we know about colours and how we come to know it. I believe that Wittgenstein's later philosophy gives good answers to these questions, and that his answers furthermore show a close affinity to Goethe's *Farbenlehre* even though they are clearly distinct from those aspects of the *Farbenlehre* which were adapted by the German Idealists as described in the last two chapters.

Although Wittgenstein's early philosophy by nature belongs to the next chapter, the failure of it to explain colour makes it a suitable introduction to Wittgenstein's more successful accounts of colour as given in his *Remarks on Colour* and other of his later writings (especially *Philosophical Investigations* and *On Certainty*). I shall therefore begin this chapter with a discussion of the colour exclusion problem. This is followed by a section on colour samples and Wittgenstein's emphasis on the context in which colour words are used. As I believe that Wittgenstein's emphasis on use is close to Goethe's intentions in the *Farbenlehre*, I shall argue that common aspects between the two writers are not merely superficial as in their use of numbered paragraphs but extend to treating their readers as "apprentices", who are to use their works to discover colour (or whatever the object of investigation) by themselves. I also believe that Wittgenstein's notion of colour samples is similar to Goethe's notion of phenomena, although I do not think that this is their only plausible interpretation.

As in the last two chapters I shall conclude this chapter with a brief overview of recent arguments about objectivism. I shall conclude that although the objectivists'

arguments are stronger than those of the strong subjectivists they are still insufficient to capture or explain all colour phenomena.

## 1. The Colour Exclusion Problem

It is generally assumed (Hacker, 1972, ch.4) that it was the failure of the *Tractatus* to deal with the problem of colour exclusion that initiated, if not determined, Wittgenstein's changes in his philosophy.<sup>1</sup> My own account of the colour exclusion problem rests on passages from *Tractatus Logico-Philosophicus*, *Some Remarks on Logical Form* and *Philosophical Remarks*.

According to the *Tractatus* we analyse sentences into elementary propositions (4.221), and elementary propositions are by definition independent from one another (4.211, 5.134). Thus we may not infer one elementary proposition from another nor exclude one by affirming another. So when Wittgenstein adds to 6.3751 "(...The statement that one<sup>2</sup> point of our field of vision has two different colours at the same time is a contradiction.)", he means that therefore this statement cannot be the product of two elementary propositions. For "It is clear that the logical product of two elementary propositions can neither be a tautology nor a contradiction" (*ibid*).

When looking for a reason, why the statement that one space-point cannot have two different colours at the same time is a contradiction, one has to remember that

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<sup>1</sup> See also Austin and Sievert who disagree about the extent to which Wittgenstein's later philosophy diverges from his earlier philosophy (J.Austin, "Wittgenstein's Solutions to the Colour Exclusion Problem", 1980; and D.Sievert, "Another Look at Wittgenstein on Colour Exclusion", 1989.)

<sup>2</sup> The German expression "ein Punkt" is ambiguous. I prefer to translate it as "one point" rather than as "a point" (Pears and McGuinness) to emphasise the contradiction.

colours are not simple objects. Instead "[s]pace, time and colour (being coloured) are forms of objects."<sup>3</sup>, where form is "the possibility of structure".<sup>4</sup>

So, objects are simple and colourless (2.02, 2.0232). Space, time and colour are forms of objects (2.0251), and form is the possibility of structure (2.033). Wittgenstein calls time and space "argument-places" for spatial objects, and suggests that something similar must be true for colour, which makes colour an argument-place for all visible (spatial) objects:

"A spatial object must be situated in infinite space. (A spatial point is an argument-place.)

A speck in the visual field, though it need not be red, must have some colour: it is, so to speak, surrounded by colour-space..."<sup>5</sup>

To explain the colour exclusion problem Wittgenstein proposes the ordering of colours according to their *kinetic* properties in the line of the spectrum, i.e. spatially.<sup>6</sup> So while Wittgenstein holds on to the view that colour concepts are not part of elementary propositions and hence colours not simple, the question why two colours cannot occupy the same place is reduced to elementary propositions about spatial occupation of one point in space-time.

As we divide both time and space into numerical units - be it years or seconds, yards, metres or miles - the exclusion of other times and spaces from the here and now (when numerically defined) follows from our linear numerical system. It is a logical necessity for our understanding of the world around us that nothing can be in two places at the same time, and this necessity can be justified by simple algebra. That nothing can have two different colours at the same time is less obvious to us, and the temptation is great to explain this fact by similar means. In order to explain colour exclusion as a contradiction it is therefore irrelevant whether one reduces colour to

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<sup>3</sup> "Raum, Zeit und Farbe (Färbigkeit) sind Formen der Gegenstände." (TLP 2.0251)

<sup>4</sup> "Die Form ist die Möglichkeit der Struktur." (TLP 2.033)

<sup>5</sup> "Der räumliche Gegenstand muß im unendlichen Raume liegen. (Der Raumpunkt ist eine Argumentationsstelle.)

Der Fleck im Gesichtsfeld muß zwar nicht rot sein, aber eine Farbe muß er haben: er hat sozusagen den Farbenraum um sich..." (TLP 2.0131)

<sup>6</sup> See also *Diaries*, 18.08.1916 and 08.01.1917.

wavelengths, energy flux,  $sir^7$  or, as Wittgenstein suggests, to velocity of particles (TLP 6.3751) - as long as one expresses it numerically (i.e. quantitatively).

This, however, raises further questions: First of all, one has to choose between the different ways of reducing colours to quantities. Wittgenstein's suggestion of the spectral line is probably the least suitable of all, as most of the colours surrounding us do not occur in a pure spectrum: black, white, grey, and brown, as well as all mixtures of colours with black or white are not part of the spectrum, nor are luminous synthetic colours like those of text markers or neon lights. And even if the spectrum did include all colours there would still be a problem about the degree of precision we wanted to apply: As most colours which match the spectrum phenomenally are in fact metamers, i.e. mixtures of light waves, we would have to decide whether a further analysis into their components was necessary or whether a phenomenal match would be sufficient (in which case we would have to take the perceiver into account and reach a weak subjectivist viewpoint).

One could also ask whether the impossibility of two properties occupying the same space at the same time is a physical or a logical impossibility. As I just demonstrated, the physical impossibility depends on the degree of precision one wants to achieve. (The importance of context will become clearer in Wittgenstein's later philosophy, where we will also find a genuine solution to the colour exclusion problem, namely that we cannot see the same speck of our visual field *as* two different colours.) In *Remarks on Logical Form* Wittgenstein is still interested in a logical solution but realises that it cannot be a solution analysable in a truth table. For if colour statements were truth-functional in the usual sense, they should allow for four possibilities of statements about two colours being true: An object should be able to be of one colour, of the other colour, of neither colour, or of both colours. This last case, however, must be categorically excluded (see also Sievert, p.294).

In order to label "this object is red and green all over at the same time" a contradiction, the meaning of "red" would have to be "not green, nor blue nor yellow nor brown nor black..." ad infinitum. In cases of particular shades of red it would even need to include "...nor crimson nor purple nor any other shade of red but this one"

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<sup>7</sup>  $sir$  = "spectral integrated reflection", a term coined by Edwin Land; see also section 4.1 of this chapter.

which is plainly absurd. Any attempt to show that red and green logically contradict each other in the sense of analytical necessity must therefore fail. And as in the *Tractatus* logical necessity is analytical necessity, the *Tractatus* fails to account for problems such as this one.

For statements of degree Wittgenstein therefore introduces a new notion of necessity, namely that of necessary exclusion. We introduce the rule, that if something has one property in a certain category then it cannot have another property in the same category. Thus nothing can have two sizes or temperatures or speeds at the same time. The most obvious case of this kind of exclusion is that no object can be of two different lengths at the same time. At first sight, Wittgenstein's yardstick metaphor is thus useful to explain colour exclusion: We can imagine someone holding a spectrum chart with colour names to a coloured object and accordingly judging that its colour is such-and-such, just as we might imagine someone holding a yardstick to an object to find out its length. Furthermore, we can also imagine the spectrum being stretched into different lengths (i.e. different degrees of precision) for different purposes just as we can have measuring rods of different lengths and detail. Finally, it is the gradations on the yardstick that make it a yardstick, and we might say that it is only incidental that a yardstick is physically one yard long - we could have a yardstick that was two yards long.<sup>8</sup> Thus a properly graded yardstick can be used to measure most different lengths (with the exception of extremely small or large ones). Similarly, the spectrum chart encompasses all saturated colours and can be used to name any pure colour. And just as a one yard long stick without gradations is not a yardstick even if it can be used to measure whether an object is one yard long or not, a spectrum chart with only one colour is no longer a spectrum but a colour sample. (I shall come back to Wittgenstein's use of colour samples in section 2.)

The yardstick metaphor rests on the following notion of space: in any space-time there is by definition in the smallest unit only space for one property of each category (colour, length, etc.). Thus if a unit has the colour-property red then it cannot have any other colour-property, just as an object of a certain length cannot be of any other length.

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<sup>8</sup> though of course not one that was half a yard long. Even if we could *use* it to measure a yard-long -object, it would not be a yardstick as it would not have the grade "1yd".

This spatial reasoning, however, misses the point. For as Wittgenstein realises in the *Philosophical Investigations* as well as in his *Remarks on Colour* (and, judging by his examples, much earlier), there is an important difference between saying that something cannot be red and green all over and saying that something cannot be red and yellow all over. Anyone who is interested in colour, provided he is not colour-blind, can *see* that a certain shade of orange lies somewhere between red and yellow, and this fact is reflected in our language: Thus our references to a "reddish orange" or a "more yellowish orange" shows that we do indeed think of colours as being more of one colour and less of another (much like a mixed drink). No one, however, speaks of a "reddish green" or says that he can *see* a colour which lies somewhere between red and green in this sense.<sup>9</sup> Someone once showed me the iridescent lining of his jacket which looked red or green depending on its spatial relation to the perceiver and the light source. So in one sense, this fabric was red and green all over, but it was not so in the same place and at the same time.<sup>10</sup> Thus at any time and in any position one could have divided the surface of the lining into small patches, some of which would have been red and others green, but none of which would have been both.

As I shall argue in my chapter on primary colours (ch.VIII), the solution to the colour exclusion does not lie in the yardstick but in the colour circle: Were Wittgenstein to use a colour circle as measuring device for colours rather than the linear spectrum, he would be able to see and show that the circle does not allow for one patch of colour being red and green all over at the same time because red and green are at opposite sides of the circle and cannot possibly be made to match one place at the same time. So I do not agree with Austin's judgment that the yardstick metaphor dramatically improves Wittgenstein's case because it cuts out the looking at phenomena.<sup>11</sup> Wittgenstein's use of phenomena in my opinion is much closer to Goethe than Sievert and Austin make it to be, so that some of their criticism misses the point. Sievert, for

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<sup>9</sup> See also R.C.I. 9,10,11,14,21,78; III, 42,94,129,138,162,163.

<sup>10</sup> Note also that the second definition of "iridescent" is "changing colour with position" (*The Concise Oxford Dictionary*, 1991).

<sup>11</sup> Although Austin refers to the *Philosophical Remarks* when he writes "the yardstick metaphor ... is a dramatic improvement over the inadequate answer to the colour exclusion problem.." (*ibid.*, p.148), my criticism is still valid as it refers to the metaphor itself.

instance, explains that in Wittgenstein's use of "symbol" a symbol simultaneously represents the particularity and the type, but he does not apply the same notion to Wittgenstein's use of phenomena.<sup>12</sup> Yet this understanding of phenomena leads us to what Wittgenstein and Goethe have in common: If a colour symbol (and, as we shall see, Wittgenstein's colour sample) can represent both type and token (in the Davidsonian sense) then the truth it expresses is at the same time a factual truth and a logical truth.

In the case of the yardstick we see that the yardstick can both be physically one yard long and be used to represent the type "one-yard-long". But the *physical* length of one yard is not a necessary condition for the *representation* of one yard (the yardstick may in fact be longer than one yard). When we apply this insight to the colour-exclusion problem we see that in a different physical world different sets of colours might have been mutually exclusive. If it made sense to use our colour concepts in such a world (which I don't think it does), we might thus say that red and blue rather than red and green were mutually exclusive. So *physically* the colour exclusion of red and green is an empirical fact of our world, not a necessity. Conceptually, however, it is absolutely necessary that red and green are mutually exclusive (which is why I think that our colour concepts would not apply in such a physically different world).

I shall argue for the necessities in the structure of our colour concepts in my chapter on primary colours and novel hues (ch.VIII). For now let me conclude that what I have learnt from Wittgenstein's early treatment of colour is the following:

1. Statements about colour cannot contradict each other but may exclude each other. They are hence not analytically true or false.
2. An object such as a yardstick or a colour chart (be it circular or linear) can be a physical object and a representation of logical relations at the same time.

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<sup>12</sup> In a positive evaluation of Hintikka's *Investigating Wittgenstein* he treats Wittgenstein's early phenomena as sense-data (Sievert, pp.302-303).

## 2. Colour Samples

In Wittgenstein's later philosophy the yardstick is replaced by the sample. Hacker argues that the use of samples is very much like that of a yardstick (1987, pp.150,157). Yet I hope to show that there is an important difference between the two, and that this difference may well be an important difference in the development of Wittgenstein's philosophy of colour. What Wittgenstein has added to the yardstick simile is the example of the standard metre in Paris:

"There is *one* thing of which one can say neither that it is one metre long nor that it is not one metre long, and that is the standard metre in Paris." (PI.50)

While it might seem that there is not much of a difference between a yardstick and the standard metre in Paris the essential difference is hinted at in the word "standard metre": In German the standard metre is called "Urmeter", and as I shall argue in this section it is much closer to Goethe's idea of Urplants and Urphenomena than to yardsticks.

### 2.1. Yards and Metres

First, let us see what difference there is between the yardstick and the standard metre. Although any yardstick should be one yard long to be a yardstick, a production error might lead to faulty yardsticks, in the context of which it would make sense to say "Ah, but *this* yardstick is one yard long." Hacker gives the example of a drenched tape measure which ceases to function as a sample when it gets measured itself as to whether it has shrunk (1987, p.162). The standard metre in Paris, on the other hand, is at the very origin of measuring things in metres and therefore not the kind of thing that shrinks and needs being measured. Were the standard metre a different length from what it is our notion of metre would be a different one. For this reason the standard metre is like a new invention. If I invented something and called it the "Kerstin-machine", and if someone visiting me looked at it and asked whether it was a genuine Kerstin-machine, I should be perplexed. If other people, however, started building similar machines we could then say that some were Kerstin-machines and others were

not. Similarly, with newly produced yardsticks and metre rods we can decide which of them are genuine and which ones are not.

Wittgenstein's colour samples are of the kind of the standard metre rather than of the yardstick: they are not themselves representations but means of representation, instruments of our language by which we decide whether something falls under a certain name or not. (PI.50, also 16)

## 2.2. Particular Samples

By particular samples I mean those samples which are exactly like what they represent. A botanist, for instance, may give me a sample of a Scottish primrose and ask me to locate as many of these primroses as I can find. If I include other kinds of flowers or even other kinds of primrose in my report I have failed to understand the task. *Philosophical Investigations* begins with language games of the primrose type: there are tables containing shapes and colours according to which someone playing the game picks out objects (PI.53). These cases may seem simpler than the one of the primrose but are essentially the same because we imagine there to be nothing but columns and slabs, or apples and pears, or red and blue objects, from which someone chooses according to the samples - just as I would only decide within a limited group of flowers which ones were genuine Scottish primroses, and not among animals or just anything around me.

The only problem in applying particular samples is the general one of ostensive definitions: I need to be aware of my task in the first place, and I need to know which aspect of the sample is relevant. In the case of colour samples, for instance, I must learn to disregard the shapes and textures of the samples I use. The knowledge of how to use a sample as such does not cause us problems. Children learn at an early age how to sort things into different heaps according to different criteria, and I guess that they learn this by being shown what to do - i.e. by an adult "setting an example". Psychologically therefore it does not seem to be difficult to learn the use of samples.

### 2.3. General samples and their contexts

Any blue sample must have a particular shade of blue. The same rectangular piece of cardboard painted in a particular shade of blue may however be a sample for this particular shade of blue, or for dark blue, or for blue in general. So there is nothing in the sample itself which can help us decide what it is a sample of or that it is indeed a sample.

What is essential for any sample is therefore the context of use. This context may be linguistic, as in an instruction manual, or ostensive - "use it like these kinds of things"; but the extension of a particular sample is also defined by other samples within the same language game. The importance of the context of other samples becomes clear when we think of the several hundred colour systems there are. Within each system the number of colours given will determine the degree of discrimination to be used. Also, the structure of the system will show what counts as a clear and what as a borderline case. Some systems may limit their applications to certain kinds of colour (paints, fabric, lights etc.), others to certain uses of colour (decorative, informational etc.). We might, for instance, find a catalogue with several samples of phenomenally widely differing colours which are yet all suitable for the same purpose. A light blue, for instance, which is phenomenally quite close to a slightly darker blue given in the section "solicitor's office" might still be better for the children's bedroom than for the office because in this case the lightness of colour is more relevant than the hue.

So on the level of particularity I need to know relative to what the samples were chosen as well as out of which variety of things they will have to serve as samples.<sup>13</sup> There must be a decision as to what all samples of one category are to have in common that makes them suitable for the same purpose. The most general sample should not be relative to anything but represent its own category. As most categories are ordered in hierarchies (indigo, blue, colour), with exception of the very highest and lowest in the category each sample is more general than the one below and more particular than the one above itself. Arguably the primary colours are by definition the most basic colours

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<sup>13</sup> As I said above, samples for a simple language game containing only red and blue objects need not be particular about the shade of the colour sample.

so that we should be able to exemplify each primary colour by one sample only.<sup>14</sup> Choosing a colour sample to represent "blue" I should thus avoid marginal blues such as violet or light blue.

Which particular shade of colour a colour sample should have depends entirely on the degree of precision required. This in turn is related to the number of colour terms in the relevant language game. If there only are four colour terms (red, blue, green and yellow, for instance) then any shade of blue is sufficient to be used as a sample for "blue". If, however, there is a great variety of colour terms, such as in an artists' workshop, only particular shades of each colour (such as ultramarine or Prussian blue) will be useful as they have to exclude not just all reds, greens and yellows but also other shades of blue.

#### 2.4. The shape of a leaf

"Ask yourself: what *shape* must the sample of the colour green be? Should it be rectangular? Or would it then be a sample of a green rectangle? - Should it be "irregular" in shape? And what is to prevent us then from regarding it - that is, from using it - only as a sample of irregularity of shape?"<sup>15</sup>

If someone showed me a very furry piece of blue carpet, I would be more likely to take it as a sample of a strange texture than of the colour, and if a blue piece of cardboard had the shape of Edinburgh Castle I would be more likely to notice the shape than the colour. This shows that there is nothing intrinsic to the sample itself that makes it a sample of something specific. Only if I am told or otherwise made aware of how to use it, will it become a sample of something particular.

With regard to shape samples themselves, Wittgenstein uses the leaf as his example. This is less surprising than might appear if we refer back to Goethe's morphology of plants, in which Goethe suggests that the "Urform" of any plant is the

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<sup>14</sup> That there are several notions of "primary colour" will be explained in chapter VIII.

<sup>15</sup> "Frage dich: welche *Gestalt* muß das Muster der Farbe Grün haben? Soll es viereckig sein? oder würde es dann das Muster für grüne Vierecke sein? - Soll es also "unregelmäßig" geformt sein? Und was verhindert uns, es dann als Muster der unregelmäßigen Form anzusehen - d.h. zu verwenden?" (P.I.73)

leaf. The shape of a leaf is also much less like a yardstick than a triangle or a circle are. So, what Wittgenstein is offering here is not only a new and helpful investigation into the status of Goethe's Urplants and Urphenomena, but also a move away from examples that can be quantified or easily defined. Both colour and leaf can be samples for relatively particular or for more general concepts. It is possible that someone who knows absolutely nothing about plants could think of an image of a leaf without thinking of a particular plant, but whenever I try to draw a "general leaf" it resembles the leaf of a particular plant or family of plants. Yet I think I could find some five to ten basic leaf shapes.<sup>16</sup>

The most obvious difference between leaf and colour samples is that we usually think of leaves themselves as particular objects, whereas colours, although usually thought of as properties, can be imagined as abstracted from objects. On the other hand, my basic leaf shapes are not that different in function from basic "primary" colours, as I can develop all other leaf shapes from basic leaf shapes just as I can mix or construct all colours using the primary colours. Someone might argue that circle, square and triangle are the three simplest shapes from which all other shapes, including those of leaves, can be derived.<sup>17</sup> Yet with regard to leaves it is surely more useful to refer to a few simple leaf shapes in one's categorisation than to the far more abstract geometrical forms. For the least any leaf shape contains is its attachment to the stem of the plant, and this relation alone, which is so easily described as "leaf with a stem", would be hard to reduce to geometrical forms. Similarly I might say that the simplest identification of a colour is by reference to white, black, and a few primary colours. Any other description, though perhaps more easily quantified (such as wavelength or energy flux for instance) is much more difficult to use.

The point about colour samples is that there is no one standard colour, no one Ur-sample of colour, but only several sets of samples. So unlike the standard metre in Paris, colour and leaf samples form a family of samples which allows for variations.

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<sup>16</sup> According to my encyclopedia there are twelve leaf shapes and six kinds of leaf edges (*dtv-Brockhaus* in 20 Bänden, 1986, vol2, p.197.); the twelve leaf shapes listed in my nature guide, however, have only seven of them in common with this listing, and the list also differs about one leaf edge (*Collins Nature Guide to Wild Flowers*, Lippert & Podlech, 1994).

<sup>17</sup> And there have been many artists who identified primary colours with simple geometrical forms (see also chapter VIII).

These variations are unlike the variations found in different units of measurement. For a metre can only be meaningfully used in conjunction with centimetres or kilometres, not with yards, feet, or miles. Furthermore, a metre is a precise fraction of a kilometre and a multiple of a centimetre. Colour and leaf samples on the other hand, have genuinely different samples in their families, i.e. samples that are not mere multiples of each other, but are qualitative variations related to each other by qualitative resemblance.

## 2.5. The Use of Colour Samples

"...for it would only be to say that, as a matter of experience if you *see* the leaf in a particular way, you use it in such-and-such a way or according to such-and-such. Of course there is such a thing as seeing it in *this* way or *that*; and there are also cases where whoever sees a sample like *this* will in general use it in *that* way and whoever sees it otherwise in another way." <sup>18</sup>

Once basic colour samples are established we can use them for several purposes. For the sake of argument let us assume that we have found six standard samples of the colours red, yellow, blue, green, black and white: pillarboxes, daffodils, the Scottish summer sky, grass, coal and snow. These can be used to test the understanding of colour concepts, as well as to establish new colour concepts in three stages:

The grasping of the sample as particular means that any person who claims to understand the six colour concepts must be able to sort all objects which are clearly one of the six main colours into the right category. Thus fire-engines, ladybirds, geraniums, and strawberries belong in the same category as pillarboxes, but water, grass, and snowdrops do not.

Secondly, all objects that do not clearly belong into one of the categories must be described at least by saying between which of the categories they belong. This task requires the understanding of the general concept within which the samples function. The person claiming to understand our six basic colour concepts must be able to say

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<sup>18</sup> "...denn es würde nur besagen, daß erfahrungsgemäß der, welcher das Blatt in bestimmter Weise *sieht*, es dann so und so, oder den und den Regeln gemäß verwendet. Es gibt natürlich ein *so* und *anders* Sehen; und es gibt auch Fälle, in denen der, der ein Muster *so* sieht, es im allgemeinen in *dieser* Weise verwenden wird, und wer es anders sieht, in anderer Weise." (P.I.74)

that oranges are half way between red and yellow, that bluebells are blue with a tint of red, that the sea is somewhere between blue and green, and so on<sup>19</sup>. The person must also be able to say that a penguin is black and white, that a certain dress is blue with yellow flowers, etc.

Thirdly, we can now name finer colour distinctions. By naming oranges "orange", carnations "pink" and wood "brown" we establish new samples. This is essentially the procedure used in colour systems such as that of the ISCC (International Society Colour Council) which named 7,500 colours by writing their names onto the Munsell colour samples, and thus established an international colour lexicon. This colour lexicon like any other lexicon is a reference tool with which people can find the "proper names" of any unicoloured colour sample.

What seems so absurd about these 7,500 colours is that most of their names are never used except by a few experts. And these few experts are not likely to use them at home either. They will not even be able to distinguish between subtle shades unless they have their colour samples with them, since one criterion for most modern colour systems is that each colour must be indistinguishable from the one next to it but recognisable as different from the one after that.

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<sup>19</sup> The sea, by the way, is an interesting case for what may count as a sample for the typical colour of a particular kind of object: the first argument over colour I can remember was one I had with my kindergarten friend who had been to the sea. He claimed that the sea was green. I, on the other hand, "knew" from books that the sea was blue. (My mother then said that the sea could be both, green *and* blue, which did not help me in the least).

## 2.6. Conclusion

We can now agree with Wittgenstein's claim that colour samples are neither coloured nor non-coloured (the SCCA could not have used black and white samples for their 7,500 colour words since in that case they would not have had samples of colour but only samples of grey shades). Thus the colour sample qua *colour* sample is coloured but *which* colour it is is up to the colour sample to tell us, not the other way round.

We have to beware not to confuse the sample as sample with its actual properties. As mentioned before Wittgenstein warns explicitly of this.<sup>20</sup> This means on the one hand that any search for an ideal blue sample is misguided: the sample qua physical object cannot have ideal properties, and no matter which shade of blue it has, it will never be of such a shade that it may not appear slightly reddish or greenish in certain contexts. From this it follows that, given a vague context, any blue which is reddish or greenish will yet serve the same purpose as a purer blue (if, for instance, I wanted to teach a child the basic colour terms).

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<sup>20</sup> "This is due to the fact that one tries to fix the properties of the Ur-Image in the investigation. And as one thus confuses Ur-Image and object, one has to dogmatically attribute to the object what must only be characteristic of the Ur-Image. On the other hand, one believes that the investigation lacks the generality one wishes to attribute to it, if it only truly applies to the one case. But the Ur-Image is proposed to be just that; that it characterises the whole investigation and determines its form. It thus forms its head and is valid because it determines the form of the investigation, not because everything true of itself can also be said about all the objects in the investigation."

"Das kommt nun daher, daß man den Merkmalen des Urbilds einen Halt in der Betrachtung geben will. Da man aber Urbild und Objekt vermischt, dem Objekt dogmatisch beilegen muß, was nur das Urbild charakterisieren muß. Andererseits glaubt man, die Betrachtung habe nicht die Allgemeinheit, die man ihr geben will, wenn sie nur für den einen Fall wirklich stimmt. Aber das Urbild soll ja eben als solches hingestellt werden; daß es die ganze Betrachtung charakterisiert, ihre Form bestimmt. Es steht also an der Spitze und ist dadurch gültig, daß es die Form der Betrachtung bestimmt, nicht dadurch, daß alles, was von ihm gilt, von allen Objekten der Betrachtung ausgesagt wird." (Verm.Bem., p.469)

### 3. Wittgenstein and the Return to Goethe:

#### Causal Explanation versus Conceptual Analysis

Wittgenstein is reported to have found Goethe's *Farbenlehre* "partly boring and repelling, but in some ways also very instructive and philosophically interesting"<sup>21</sup>. Like Schopenhauer and Hegel, Wittgenstein chooses a few of Goethe's remarks and integrates them into his own philosophy. Unlike the others, however, he concentrates on the status of these remarks.

According to Monk Wittgenstein read not only the *Farbenlehre* but also Goethe's *Metamorphosis of Plants*. The famous discussion between Goethe and Schiller as to whether the Urplant is a genuine plant or just an idea was decided by German Idealists in favour of the idea. Wittgenstein, however, succeeds in explaining how the Urplant can be both. Although he does not explicitly refer to Urplants and Urphenomena in *Remarks on Colour*, Wittgenstein's treatment of colour samples as both physical entities and conceptual tools is a good explanation of what Goethe is trying to say. More important though, is the affinity between Goethe and Wittgenstein when it comes to their method:

"It is not the same thing to say: the impression of white or grey comes about under such and such conditions (causally), and: it is an impression in a certain context of colour and form."<sup>22</sup>

Even though Goethe seeks and describes conditions under which colour phenomena appear, he treats these conditions not as causes but as necessary contexts. Furthermore, Goethe's *Morphology of Plants* is usually not read as an early evolutionary theory but as showing how different parts of plants are internally related.<sup>23</sup> I believe that it is this

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<sup>21</sup> Monk, p.561.

<sup>22</sup> "Es ist nicht dasselbe, zu sagen: der Eindruck des Weißen oder Grauen kommt unter solchen Bedingungen zustande (kausal), und: es ist ein Eindruck in einem bestimmten Zusammenhang von Farben und Formen." (R.C.I,51)

(The German word "kausal" can be both adjective and adverb - in contrast to McAlister and Schättle I prefer to translate it adverbally to emphasize the time element in causal explanations.)

<sup>23</sup> For a historical reading see A.Schmidt; but Sepper (1987 and 1988), and Burwick (1987), for instance, read Goethe's theory as non historical.

aspect of Goethe's scientific writings that Wittgenstein associates with when he differentiates between his own "logical" or "grammatical" enquiry and that of physicists and psychologists. In this section I shall give a closer analysis of this difference, which is most clearly expressed in the following quotation:

"It is not the same thing to say: the impression of white or grey only comes about under such and such conditions (causally), and to say that it is the impression of a certain context (definition). (The first is Gestalt psychology, the second logic.)"<sup>24</sup>

Wittgenstein seeks the context. His addition of the term "definition" in the later version of this paragraph shows that he does not mean the physical context which Goethe specifies, but the linguistic context in which the words "white" or "grey" are used. Goethe's physical conditions and Wittgenstein's linguistic context, however, overlap. Thus Goethe might specify that a halo appears around a weakly (i.e. non dazzling) luminous object in certain conditions, and Wittgenstein might use these conditions as the linguistic context for defining "halo" as "the appearance around a luminous object under certain conditions". Both would imply that anyone saying "Look at that beautiful halo" is not blind and knows what the word "halo" means. There is thus a requirement of a minimum level of expertise not just for *seeing* the halo but for calling it a halo, or *seeing* it as a halo.

"I am not saying here (as the Gestalt psychologists do), that the impression of white comes about in such-and-such a way. Rather the question is precisely: what is the meaning of this expression, what is the logic of this concept?"<sup>25</sup>

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<sup>24</sup> "Es ist nicht dasselbe zu sagen: der Eindruck des Weißen kommt nur unter diesen Bedingungen zustande (kausal), und daß er der Eindruck eines bestimmten Kontextes ist (Definition). (Das erste ist Gestaltpsychologie, das zweite Logik.)" (R.C.III, 229)

McAlister and Schättle omit the word "nur" in their translation, yet I believe that "only" emphasises the idea of causal determination which is then juxtaposed to certainty of context. As the *Remarks on Colour* were written at about the same time as *On Certainty* we may assume that Wittgenstein was thinking about the difference between certainty of physical causes of an event, and the certainty of logical relations. Note also that the word "bestimmten" could be translated as "determined" or as "specific" - neither of which has the connotation of subjective certainty about it, which is carried by "certain context".

<sup>25</sup> "Ich sage nicht (wie die Gestaltpsychologen), daß der *Eindruck des Weißen* so und so zustande komme. Sondern die Frage ist gerade: Was der Eindruck des Weißen sei. Was die Bedeutung dieses Ausdrucks, die Logik des Begriffes ist." (R.C.I,39)

In *Philosophical Investigations* (part II, section 11), where Wittgenstein discusses the notion of "seeing as" he again stresses that a physiological explanation is not helpful: "Our problem is not a causal but a conceptual one." (p.203e)

### 3.1. Levels of Explanation: Appearance and Reality

There are two related differences between a causal and a logical account: one is that the causal account links two levels of explanation while the logical account remains on one level, and the other is that any causal account is by nature endless whereas a logical account is true within a closed system which contains certain axioms.

" 'Cause' is used in many different ways, e.g.

- (1) "What is the cause of unemployment?" "What is the cause of this expression?"  
[experiment and statistics]
- (2) "What was the cause of you jumping?" "That noise."  
[reason]
- (3) "What was the cause of the wheel going round?"  
[mechanism]"<sup>26</sup>

There are probably at least half a dozen good ways of differentiating between different kinds of causes (one of which is Schopenhauer's in his *Fourfold Root*), but what they all have in common is that the cause is not as apparent as the effect. Thus the cause of unemployment may be very complex and have long historical roots, and the cause of an immediate action is a combination of will - which again is caused by different kinds of motivation - and a physical movement - which, just like the movement of a mechanism, again has several physical causes, one immediate and several underlying ones.

A causal explanation of seeing something blue, as given by a psychologist for instance, will also involve something non-apparent in the situation, something hidden from our eyes, because explanations given in psychology share with those in physics the assumption that there is another reality behind what is immediately apparent. Goethe warns us about this approach ("Do not look behind the phenomena", "the phenomena are reality ", etc.), and arguably the whole of Wittgenstein's later philosophy is a series of repeated warnings to the same end.

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<sup>26</sup> *Lectures on Aesthetics* I,12.

"Psychology, when speaking of appearances ["Schein"] connects appearance with reality ["Sein" - "Being"]. We, however, can speak of appearances alone, or we connect appearances with appearances."<sup>27</sup>

"We want to *understand* something that is already in plain view. For *this* is what we seem in some sense not to understand."<sup>28</sup>

In the introduction of his *Farbenlehre* Goethe explains the omission of a theory of light by saying that the *Wesen* (nature or essence) of a thing is [the sum of] its acts or deeds. Thus colours are the essence of light, and the essence of each colour is what it does: where and when it appears, whether it pleases or displeases, in which contexts it is most noticeable, and so on. Here we find a close parallel to Wittgenstein's understanding of meaning defined by use and context. Monk writes about Wittgenstein: "His attitude is summed up by Goethe's line in *Faust*: "Im Anfang war die Tat." ("In the beginning was the deed."), which he quotes with approval<sup>29</sup>, and which might, with some justification, be regarded as the motto of *On Certainty* - and, indeed, of the whole of Wittgenstein's later philosophy."<sup>30</sup>

Goethe and Wittgenstein thus seek explanations within the realm of appearances as experienced by intelligent human beings and avoid explanations which refer to some other reality: they describe connections within one level of explanation rather than deducing or reducing from one level to another. By this means they also avoid the danger of infinite regress. Thus Wittgenstein: "At some point one has to pass from explanation to mere description."<sup>31</sup>

The importance of this can easily be seen in the child's endless series of asking "why?". Children have not yet learnt what to accept as true and what to question

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<sup>27</sup> "Die Psychologie, wenn sie vom Schein spricht, verbindet Schein mit Sein. Wir aber können vom Schein allein sprechen, oder wir verbinden Schein und Schein." (RC.III.232), see also:

"Die Psychologie verbindet das Erlebte mit etwas Physischem, wir aber das Erlebte mit Erlebtem" : "Psychology connects the experienced with something physical, we however the experienced with the experienced." (RC.III.234).

<sup>28</sup> "Wir wollen etwas *verstehen*, was schon offen vor unsern Augen liegt. Denn *das* scheinen wir, in irgendeinem Sinne, nicht zu verstehen." (P.I.89)

<sup>29</sup> *On Certainty*, 402.

<sup>30</sup> Monk, p.579.

<sup>31</sup> "Einmal muß man von der Erklärung auf die bloße Beschreibung kommen." (C.189)

meaningfully,<sup>32</sup> while scientific experts know where to ask further questions within the causal framework. But only philosophers can explain the a priori limit and condition of all questioning, and Wittgenstein places this limit in mere description. So, while Goethe and Wittgenstein describe *what* is true about colour, a causal explanation tries to explain *why* these things are true. Any causal explanation is therefore only useful once we have established a general understanding of its context, i.e. of what it is that we want to explain, and any investigation which seeks to establish causal relations must first know what these are meant to explain. The definition of what we are trying to explain, however, entails what kind of causal explanation we are looking for (motive, mechanical cause, reasoning, etc.). It is again the philosophers who make method their object of investigation, while the other sciences already imply certain methods as part of their research.<sup>33</sup>

The equating of colours to wavelengths, for instance, is the answer to a specific question in the field of physics, which besides its own axioms rests on the basic colour terms already established (hence the two sides of the equation "red is X"). As has been argued by Hacker and Westphal, any reductionist account takes those terms for granted which it tries to reduce. According to Goethe and Wittgenstein, the task of the philosopher as opposed to any other scientist is therefore to understand what it is that the others are trying to explain. Answers from physicists or physiologists are of no help for their understanding of colour because scientists only give further explanations of why something appears but never say what it is that appears.<sup>34</sup>

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<sup>32</sup> *On Certainty* 310-316.

<sup>33</sup> By this I do not mean that natural scientists and psychologists are not aware of their methods but merely that they have to accept them as part of their research.

<sup>34</sup> I support this understanding of philosophy, also because it is a good way of saving philosophy from being swallowed by other academic disciplines.

### 3.2. Axiomatic Limits to Explanations

The rock bottom of the question *what* appears, or the a priori limit of all questions, is the topic of *On Certainty*. In order to learn anything we must avoid definitions ad infinitum (the eternal chain of "why?" that children ask) and assume that some things are certain. To understand colour philosophically is therefore to find out which of the colour propositions are so fundamentally certain that I would have to change my whole world view if some of them were not true. We can, for instance, learn about several sophisticated and conflicting causal explanations of colour vision and add this information to what we already know without having to change our verbal or habitual behaviour. But if someone told us that blue was lighter than white or that yellow was darker than brown we could not accept these statements without significant changes to our colour vocabulary as a whole, as well as to our ways of acting (regarding dress, art, etc.), which in their turn influence the understanding of other concepts.

There are two ways of justifying such basic axioms. The first is to propose ontologically fundamental or primary *essences*, so that the philosophical task consists in finding these essences and constructing theories around them. This approach can lead to difficulties if these essences are taken to be "more real" than everyday objects, for we then need to ask ourselves where and in what sense they exist, and how (with what faculty) we can grasp them. One way of avoiding these difficulties is to deny the divide between appearance and reality thus eliminating the problems related to it, and to argue instead that a colour system such as a colour circle is necessarily and a priori correct, so that

"The question of whether this abstract system records the *correct* relations among colour concepts makes no sense; the system itself is what determines the structural relations between the elements of the system."<sup>35</sup>

To place the necessity within the system rather than on some other level also has the advantage of explaining why there can be several systems or language games (such as exemplified by the various colour circles) each of which can claim a priori status and necessity. While Wittgenstein does not explicitly argue for this approach in

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<sup>35</sup> Marie McGinn, 1991, p.443.

the *Remarks on Colour* we can easily draw a parallel to Wittgenstein's denial of essences in meaning. The meaning of colour words just like meaning in general is determined by their use. The aim of Wittgenstein's philosophy of colour is therefore to find the contexts in which we use colour words meaningfully, and to differentiate between several different status of truths about colour (i.e. several uses of colour propositions).<sup>36</sup> Causal explanations cannot achieve these goals as they are necessarily endless.

### 3.3. Experimentum Crucis versus Use and Context

"No phenomenon explains itself by and out of itself; only many, viewed together, methodologically ordered, at last yield something that could count as a theory."<sup>37</sup>

Within different contexts one and the same sentence can mean different things. This is true of all sentences which include ambiguous words, indexicals or ambiguous sentence structures. As there is hardly a single word in English or German that cannot have at least two shades of meaning in different contexts no one would ever base a theory of meaning on one sentence. Yet this is what Newton is doing: His *experimentum crucis* is, so to say, one visual statement out of the whole range of visual appearances. And, as Goethe correctly remarks, this one statement is not even a typical one, but is highly contrived, using certain viewing angles, two prisms, a circular hole of a certain size in the shutters, and so on.<sup>38</sup> Newton's experiment is therefore less like a statement of the kind "this book is red", than like "This book looks red if I look at it through a grey tube in the bathroom at night time when there is no daylight in the room and I have to use the red lightbulb which happens to be installed there." Nobody would dream of basing a

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<sup>36</sup> Compare also Goethe: "The phenomena are worthless unless they grant us a deeper richer insight into nature or can be of (practical) use to us."

"Die Phänomene sind nichts wert, als wenn sie uns eine tiefere reichere Einsicht in die Natur gewähren oder wenn sie uns zum Nutzen anzuwenden sind." (M&R, 503)

<sup>37</sup> "Kein Phänomen erklärt sich an und aus sich selbst; nur viele, zusammen überschaut, methodisch geordnet, geben zuletzt etwas, das für Theorie gelten könnte." (Goethe, M&R, 500)

<sup>38</sup> In *Maximen und Reflexionen* Goethe names eleven conditions (M&R, 683)

theory of the meaning of red on a sentence such as this, and yet this is, or so Wittgenstein and Goethe argue (implicitly), what Newton and his followers are doing.

Newton's excuse for basing his theory on one experiment is that he believed in a deeper underlying truth. If he could illustrate this truth with even one experiment he felt he could convince other people of it.<sup>39</sup> We must not forget that Newton's theory was quite exceptional within the belief system of his time, and that through the demonstration of his theory he did indeed change some fundamental building blocks of optics. It is however not just the nature of this particular experiment which Goethe and Wittgenstein object to, but the idea of basing a theory on a single statement at all is inherently misleading (unless we adopt a Platonic ontology and believe that a single experiment can be the manifestation of a Platonic form).<sup>40</sup> As Goethe convincingly argues,

"One phenomenon, one experiment, cannot prove anything; it is the link of a big chain which is only valid in its context. If someone concealed a chain of pearls and was only willing to show us the single most beautiful pearl demanding that we believe of him that all the other pearls are the same; we should hardly find someone willing to trade with him."<sup>41</sup>

For Goethe and Wittgenstein it does not make sense to base the explanation of colour relations on a single experiment because the interpretation of any such experiment depends entirely on its framework of meaning. Only if we get to the basic axioms of the framework can we understand the experiment as unambiguous. Wittgenstein's strongest arguments for the importance of a system of meaning can be found in *On Certainty*: "What I hold fast to is not *one* proposition but a nest of propositions."<sup>42</sup> Accordingly any proof or weakening of a proposition must happen within the system

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<sup>39</sup> Schopenhauer too saw the need to convince people with practical demonstrations even if an argument was sound; see also ch.VII, sect.4.3 of this thesis where I discuss Schopenhauer's demonstration of the mixing of white.

<sup>40</sup> Goethe is somewhat torn between the two approaches - see next chapter for an interpretation of Goethe's Urphenomena as Platonic Ideas.

<sup>41</sup> "Ein Phänomen, ein Versuch kann nichts beweisen, es ist das Glied einer großen Kette, das erst im Zusammenhange gilt. Wer eine Perlenschnur verdecken und nur die schönste einzelne vorzeigen wollte, verlangend, wir sollten ihm glauben, die übrigen seien alle so: schwerlich würde sich jemand auf den Handel einlassen." (M&R 501)

<sup>42</sup> "Das, woran ich festhalte, ist nicht *ein* Satz, sondern ein Nest von Sätzen." (C.225) - also: "(My) doubts form a system." (C.126)

and must affect the whole or at least a substantial part of it (assuming that no one has an entirely consistent belief system, only parts of it need to be changed when one belief is changed).<sup>43</sup> Whichever system I am part of I cannot doubt everything:

"must I not begin to trust somewhere? That is to say: somewhere I must begin with not-doubting; and that is not, so to speak, hasty but excusable: it is part of judging." (C.150)  
"That is to say, it belongs to the logic of our scientific investigations that certain things are *in deed* not doubted." (C.342)<sup>44</sup>

With regard to colour, these undoubtable things are neither as complex as Newton's experiment nor are they individual entities like elementary propositions or Platonic Ideas. Instead they are whole structures. For just as a word loses its meaning without context - think of the odd feeling which overcomes us when we write a single word over and over again - a colour too loses its effect when there are no colours surrounding it. Thus if locked into a bare room with walls, ceiling and floor painted in the same colour one apparently loses the ability of naming ("seeing"!) the colour after a short time. There is no such thing as a neutral background which shows a colour "as it really is",<sup>45</sup> and both Goethe and Wittgenstein realise that the search for such an essence of colour is misguided from the start. Both writers also share the aesthetic aspect of context and use: whether a colour is suitable for a particular occasion or a word befitting in its context, is important to both of these aesthetically acute men.

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<sup>43</sup> *On Certainty* 105, but also 140: "A *totality* of judgments is made plausible to us.", and 410: "Our knowledge forms an enormous system. And only within this system has a particular bit the value we give it." - "*Ein Ganzes* von Urteilen wird uns plausibel gemacht." (140); ""Unser Wissen bildet ein großes System. Und nur in diesem System hat das Einzelne den Wert, den wir ihm beilegen." (410).

<sup>44</sup> "D,h, es gehört zur Logik unsrer wissenschaftlichen Untersuchungen, daß Gewisses *in der Tat* nicht angezweifelt wird." (C.342)  
Interestingly, Wittgenstein often uses the example of the names of primary colours to say that one of the things I cannot doubt is, for instance, that "this is blue". (C. 57, 126, 150)

<sup>45</sup> See also Arnheim (1978), p.342; W.Schöne (1979) argues in a similar vein that there is no such thing as a neutral background for a painting.

### 3.4. Lehre versus Theory

"Goethe's theory of the constitution of the colours of the spectrum has not proved to be an unsatisfactory theory, rather it really isn't a theory of all. Nothing can be predicted with it....Nor is there any experimentum crucis which could decide for or against the theory."<sup>46</sup>

That Goethe's Farbenlehre is not a theory is not taken to be a weakness. Rather, Wittgenstein points out that Goethe's belief in the superiority of his Farbenlehre over Newton's *Opticks* is misguided as each is valid in a different framework. While Newton's theory is useful within the framework of Newtonian physics (which Wittgenstein does not object to in itself), Goethe's framework is more adequate for philosophical purposes:<sup>47</sup> for as philosophers "[w]e do not want to find a theory of colour...but the logic of colour concepts."<sup>48</sup>

So, what is it about theory that Goethe and Wittgenstein object to? As I just explained, one aspect of theories is that (be it through an experimentum crucis or by other means) they aim to prove the truth of an otherwise hidden reality or greater truth. While scientists can indeed explain events by reference to extremely small or large (hence "invisible" or "hidden") objects such as atoms or galaxies, this method does not apply to philosophy where thinkers such as Goethe and Wittgenstein deny that such a truth exists in the first place (see p.92).

Besides the search for hidden truths and essences, however, Goethe and Wittgenstein also criticise the dogmatic nature of theories, which again is a useful or even necessary precondition for science, but is also the kind of thing to be questioned

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<sup>46</sup> "Die Goethesche Lehre von der Entstehung der Spektralfarben ist nicht eine Theorie, die sich als ungenügend erwiesen hat, sondern eigentlich gar keine Theorie. Es läßt sich mit ihr nichts vorhersagen. ... Es gibt auch kein experimentum crucis, das für, oder gegen diese Lehre entscheiden könnte." (R.C.I, 70)

<sup>47</sup> Goethe does not seem to believe in this difference between scientific and philosophical context and he probably would have objected to Wittgenstein's interpretation of his Farbenlehre as purely philosophical or even conceptual analysis. For the sake of this thesis, however, I shall stress the similarities between Goethe and Wittgenstein rather than their differences, even if it is obvious that the similarities between Goethe and Wittgenstein are incompatible with the similarities between Goethe and Hegel.

<sup>48</sup> "Wir wollen keine Theorie der Farben finden..., sondern die Logik der Farbbegriffe.." (R.C.I.22). Compare also: "Do you think I have a theory?" Wittgenstein asks in his *Lectures on Aesthetics* (I,33), and insists that he is not saying what something is (in that case "deterioration") but that he merely describes different things called that thing (deterioration).

by philosophers.<sup>49</sup> Instead of creating a theory of colour Goethe and Wittgenstein therefore establish a "Lehre", or, even less dogmatic, mere "remarks". I briefly explain in my glossary what the word "Lehre" means, but in relation to Wittgenstein's "remarks" there are two aspects of a "Lehre" which are of particular importance:

#### 1. Lehre as apprenticeship.

Goethe and Wittgenstein both treat their readers as intelligent beings who are willing to work with their writings and not merely consume them passively. The idea is that just as an apprentice has to do several exercises, repeat and vary these exercises, and will only achieve the mastering of the subject if all exercises have been done and understood, so too the reader has to treat their texts as a set of exercises. In Goethe's case the exercises are colour experiments, in Wittgenstein's case they are language exercises. (Hence the great number of imperatives used by both writers as active encouragement of participation.)

#### 2. Lehre as teaching.

Goethe and Wittgenstein do not teach by saying what their students (or apprentices) are meant to do, but mainly by omitting some connections. Thus readers face many pages of numbered paragraphs, some of which are obviously connected but many of which seem to have no connection to each other whatsoever. Yet their authors have taken years to assemble these paragraphs, and it may be assumed that the order of the paragraphs, even if it is not the one and only possible order, is intentional.

So, although Goethe and Wittgenstein both give their readers set tasks they do not explain what the outcome is meant to show. The reader therefore not only needs to do certain exercises but also to interpret them. It is only when *this* task is completed that mastership can be achieved. I therefore fullheartedly agree with Marie McGinn:

"If these remarks<sup>50</sup> about Wittgenstein's method are correct, then it seems to me clear that there can be no substitute for reading the text itself. For only in that way will the

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<sup>49</sup> As Hacker correctly points out, scientific propositions such as Newton's laws of mechanics are not empirical themselves but serve as useful frameworks for truly empirical propositions (*Insight and Illusion*, pp.8, 119, 146). It is the task of philosophers of science to question and make clearer the meaning of these propositions, not to take them for granted or teach them as dogma.

<sup>50</sup> R.C.III, 12, 15, 101, 106.

reader be led to cross and re-cross the landscape of our ordinary language games, and only in that way will Wittgenstein's aim of giving us a sense of vision of that landscape, which outstrips our ability to put into words, be achieved. It is only by reading the text that one can appreciate Wittgenstein's method of "showing my pupils details of an immense landscape which they cannot possibly know their way around".<sup>51</sup>

#### 4. General Arguments for the Objectivity of Colour

Objectivism claims that red things are red independently of perceivers. There are two ways of defending this claim: One can either reduce redness to an underlying physical quality which can be proven to exist independently of observers, or one can simply say that red things are red and that's all there is to it.

##### 4.1. Colour Reductionism

As I explained in chapter II (sect.3) there is not yet any complete reductionist account of colour to either chemical or physical entities which exist independently of observers. Nevertheless it is *possible* that scientists will find a way of reducing colours to other properties or entities. My colleague Vincent Hope gives a such a reductionist account of colour, and as it is more sophisticated than most reductionist accounts<sup>52</sup> I shall discuss it in some detail:

"Colour is whatever range of physical quantities is causally necessary and sufficient for normal colour vision. Sir<sup>53</sup> is not causally sufficient because retinal

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<sup>51</sup> Marie McGinn, 1991, p.443. Quotation from *On Culture and Value*, p.56e.

<sup>52</sup> That is to say, more sophisticated than those by Armstrong or Smart, but also and probably more importantly, more sophisticated than those accounts which (weak and strong) subjectivists continue to attack.

<sup>53</sup> Scaled integrated reflectance: the relative reflectance of each colour within coloured surroundings (and not to be confused with simple spectral reflectance): sir can explain colour constancy in varying illumination (which spectral reflectance cannot do) as well as contrasting and enhancing effects of surrounding colours. As a clear definition of each colour, sir can thus be used as an objective criterion to distinguish between real colours and colour illusions or misnaming of colours (as by colour blind people).

chemicals are also needed.<sup>54</sup> As these chemicals are external to the nervous system and do not form part of the body, they can be regarded as external causes of colour vision. Thus the physical quantities needed for vision are a range of sir which produce specific chemical effects in the retina which in turn produce specific neural effects. We can regard colour, therefore, as objective physical qualities named by the colour words."<sup>55</sup>

Before I come to the philosophical difficulties related to this account let me first brush aside two scientific objections: First of all, sir does not accommodate all kinds of colour but only those of reflective surfaces. It can however, be adapted to explain radiant colour, and for the sake of the argument I shall assume that it can also deal with the more complex situation of reflective and radiant colours interacting. Secondly, Land's account rests on assumptions which our visual system does not possess.<sup>56</sup> As Land's theory is essentially a computational model of colour vision, I am sure that these difficulties will eventually be removed. However, because it is a computational theory it only improves as it is given further background information (such as whether the image to be analysed is two- or three-dimensional). But in normal human colour vision we gain precisely this information from the colours we see - not vice versa. Thus we judge something to be a red ball because we see something red with rounded shadows and reflections on it. In contrast, the computer needs to be told that something is a ball in order to judge it to be of a uniform red colour.

So, what is missing from an account like Hope's is an explanation of the causal interaction of colour with other properties such as shape and dimensionality. As I shall explain in part II (ch.VII), the concept of transparency, for instance, only makes sense in conjunction with shapes or objects seen through something transparent. Not only is it impossible to explain transparency by Land's theory as it stands, but any extension of the theory to accommodate transparency will have to make shape and transparency part of its premisses. To this Hope might reply in the following ways:

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<sup>54</sup> Among other things retinal chemicals explain after-images, colour-blindness and colour illusions (be they caused by drugs or internal chemical causes). Retinal chemicals can thus be used to explain Goethe's "physiological colours" while sir explains "chemical colours" and presumably also "physical colours" though this might take some complex programming.

<sup>55</sup> Handout 1996.

<sup>56</sup> See Thompson, p.90

First, he might say that Land's theory can accommodate transparency without the concepts of shape and dimensionality. If this was the case, however, we would require further physiological explanations (as photochemical reactions are not sufficient to explain transparency) which in turn would make the account no longer purely objective. Thus something more conceptual than the purely quantitative *sir* needs to be added to the account in order to explain the difference between seeing a yellow object partially through a red shape (thus seeing the colour orange in the shape of the overlap) and seeing the same orange painted onto a yellow and red background. The second case is phenomenologically a completely different experience, which is the epistemological clue to knowing that these are two different objects: in the first case we have a transparent red object over a (transparent or opaque) yellow object, while in the second case there is one object painted in different colours.

Secondly, Hope might reply that he does not mean to dispute the usefulness of concepts such as transparency and redness (a point which he stresses in his criticism of Peter Hacker's philosophy).<sup>57</sup> But as such an account "says nothing about the physical character of colour" (*ibid*) it says nothing about the physical character of transparency either. While I agree with Hope on this point I nevertheless question his concept of "physical character". While colour reduced to *sir* and transparency reduced to transmittance of light might yield some knowledge about their individual physical characters, this account completely neglects their interaction. As I shall argue in chapter VII, however, this interaction is an essential part of their physical character. My understanding of physics as relevant to philosophy is thus a much broader and more naturalistic notion than Hope's one is.<sup>58</sup>

While I understand the motive of the natural scientist to look for underlying physical processes in order to explain colour vision, I do not understand why philosophers should be interested in them. If physicists discover some small scale property which all and only red things have in common and which fits more easily into their scientific discourse than the concept "red" does, they might be able to explain the

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<sup>57</sup> Handout from 14.01.1997: The first paragraph praises Hacker's discussion of colour in *Appearance and Reality* as a correct conceptual analysis of our colour language.

<sup>58</sup> I thus use the term "physis" in its wider Greek sense as "nature", also in the sense of the "Wesen" or essence" of a thing (see also glossary).

relationship between colour and some other properties within one theory. The same is not true for philosophy. It may be assumed that every single colour appearance is co-extensive with a particular combination of physical states in the external world and chemical states in our eyes and brains. It is even possible that particular *kinds* of colour appearances, red ones for instance, are co-extensive with particular *kinds* of physical and chemical combinations. But the co-extensive existence of colours with such "objective" entities cannot itself decide philosophical issues: While materialists take them to prove the objective existence of colour, the same entities can also be understood as a necessarily human and hence ultimately subjective form of representation, which depends completely on the structures of human thought.<sup>59</sup>

Reductionism rests on the assumption that co-extension, i.e. quantitative identity in space and time, is a sufficient criterion for identity as such. It thus rejects as subjective and irrelevant (if not false) any qualitative differences between the reduced and the non-reduced. But not only do "objective" physical states also have qualities (namely those attributed to them in chemical tables and physical laws), but there is no reason why these qualities should be preferable over other (non-reduced) qualities. For the reduction of colour to invisible underlying entities explains neither emotional nor aesthetic colour effects; it finds it difficult to explain the possibility of representation by colour such as in film or painting, and it takes little notice of our everyday colour concepts.

I am aware that these paragraphs fall short of any refutation of reductionist accounts as such - this would lead me too far astray. The main reason why I reject reductionism is that although I believe in its value for scientists I fear the philosophical consequences of eliminative materialism. I am aware that not all reductionists' accounts lead to eliminativism, yet I believe that the attempt of saving "qualia" and similar dubious entities from reduction is almost futile once one has entered into the reductionist framework (i.e. agreed to use its concepts). Instead I shall therefore try to show that alternative accounts are possible and can yield many insights. To put my

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<sup>59</sup> The periodic table in chemistry as well as all physical laws are constructions of human beings trying to categorise the world in such a way as to make it more accessible to human understanding. It is, however, just *one* way of categorising the world. In chapter X I briefly refer to the difference between Eastern and Western perspective in painting. Both kinds of perspective are geometrically consistent constructions. Yet they present different views of the world and its "objective" relations. (see ch.X, sect.1.2)

argument in a nutshell: Reduced colour is no longer colourful and hence loses all those properties, which make it philosophically valuable, namely the properties which can arouse emotional and aesthetic feelings, and may even lead to the communication of moral values.

#### 4.2. Non-Reductionist Arguments

Independently of the possibility of their reduction to underlying entities or properties, the following colour properties speak in favour of the objectivity of colour:

##### a) Causal Interaction

Colours causally interact with other properties whether or not they are being observed. Colour thus plays an active role in nature, which properties that entirely depend on observers (such as pains or dreams) do not do. Peter Hacker<sup>60</sup> gives the example of a black hut warming up more quickly in the sunshine than a white hut of the same material. This and similar interactions of colour with other properties can be used as a criterion for deciding between real colours and colour illusions (see below).

Besides temperature, colour has effects on all creatures with a visual apparatus, no matter how primitive (remember that I make no distinction between monochrome and chromatic colours). The information encoded in colours is essential for the survival of all seeing creatures to distinguish between predator and mate, between wholesome and poisonous food, between dangerous and advantageous environments. While this could be taken as an argument for subjectivism it is not necessarily so as I can manufacture and use objective colour samples to signal to other creatures.<sup>61</sup>

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<sup>60</sup> *Appearance and Reality*, pp.139-144.

<sup>61</sup> Evan Thompson stresses the signalling role of colour in nature to argue for a relational account of colour which takes into account both the objective (external) properties of colours and the physiology (subjective side) of the creature perceiving it. The difference between his account and that of Vincent Hope is that Thompson stresses the role of the environment and its evolution for the development of colour vision and colour concepts. Although his account is more complex (involving physics, chemistry, biology, linguistics and other cognitive sciences) and does more justice to the varieties within colour than any other scientific account I

b) Colour visually objectifies shape

Besides causally interacting with other properties, colour is *the* essential ingredient of our visual world: without colour we could not see the objects around us. I therefore believe that colours are signifiers of shape much as written words are signifiers of meaning: Imagine a purely visual world, in which we could not walk around objects and feel their textures and their weight so that colour became our one and only means of identifying objects, a world as we encounter it on television screens and in cinemas. In these "pictures" we tell an object from its background only by its colour. It is in this sense that "colour objectifies shape": without colour differences the shapes would not exist as objects of our perception. It is no good objecting that we do in fact live in a three dimensional world in which we can walk around objects and feel and lift them. For we have no difficulties whatsoever in identifying objects represented in films or on photographs. If shape is taken to exist objectively, then so is colour.<sup>62</sup>

Someone might object that the same ball could be red or blue or any other colour different from its background, and I would still see it as a ball, whereas if it was a different shape but retained its colour I would see a completely different object. To this I reply that a red ball is also a different object from a blue ball, just as a red ball is different from a red tomato. For it surely is the case that if I saw a red ball at one moment and a blue ball at the next moment I would assume that someone had swapped the two balls - not that it was the same ball which had suddenly changed colour (see below: on colour constancy).

As I shall explain in my chapter on painting, there is more to the connection of colour and shape than a mere distinction between object and background. The fact that a white circle on a black background appears to be larger than a black circle of the same size on a white background (see ch.X, sect.2 for illustration) is a first hint at what other

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have read, it is still not "philosophical" enough for my liking. What I mean by that will, I hope, become clear by the end of this thesis.

<sup>62</sup> Someone might object that the world of cinema is not the "real" world, and that the fact that viewers cannot lift up objects shown in films proves exactly this point. The voices we hear in a film, however, cannot be interacted with either and yet we would not deny that they existed. The film carries colour as much as sound from a "really existing" world, namely the world of the shooting of the film, into our cinemas and living rooms. This possibility, however, entirely depends on the objectivity of colour which makes a blue shirt visible to us as a blue shirt, whether it is in a film or lying right beside us.

properties we infer from colours. Even if this case is one of illusion, the illusion only works because we *usually* judge the size of an object together with its distance from us. And because objects close to us appear brighter than objects far away from us we misjudge the white circle on the black ground as a large circle far from us, and the black circle on the white background as a small circle close to us. Hence this illusion only works because we are generally correct in our judgments about the objects around us.

### c) Colour Constancy

Most objects remain more or less the same colour over long periods of time and even in changing lights. Thus the blue of my trousers does not suddenly change to pink or yellow when I go from natural day light into a neon lit room even if it may look slightly different under different illumination.<sup>63</sup> Nor does the blue of my trousers change when there are different people looking at them. The trousers themselves remain exactly the same.

If colour was perceiver dependent, colour constancy would be something of a miracle: each time I had a new sense-impression of the same object I would as if by magic encounter the same colour. And it is not just the colours themselves but also their interaction with other properties that remain constant. If this was not the case it would be inexplicable how we could ever learn our colour concepts, or how we could distinguish between real colours and colour illusions: for real colours are usually constant.

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<sup>63</sup> This is due to the adaption of our eyes to the illumination, so that relative to the illumination the blue remains constant, and as other colours also change with a change in illumination the colour relations between the particular shade of blue and the other colours also remain constant.

#### d) Colour Language

Colours are the objects of argument, discussion and learning. I can take colour samples into a conference to illustrate my talk, and these colour samples are as real as any object, and can even be used prescriptively to name new samples. Unlike subjective sensations such as pain (which we also talk about publicly), colours can be looked at and analysed as we refer to them - we can discuss their properties. Thus it seems to be a logical requirement for the way we talk about colour - be it talk among experts or among laypersons - that colour exists independently from us. This requirement is backed up by empirical evidence showing that all languages treat colours as external properties, even if most nations have doubts as to the constancy of colour (many metaphors of the kind "fleeting colours").

#### e) Real Colours and Colour Illusions

While it is hard to say whether someone imagines that he is in pain or whether he really is in pain as it makes no difference to him (as long as it *feels* painful to him) - the same is not true about colour. There are clear criteria about whether a car which just passed us was red or blue, criteria of the kind that can be used as evidence in a court case. Thus it is either true or false that a certain object (say, the car of the burglar) has a certain colour, and eye-witnesses are either right or deluded or lying about its colour - and the possibility of lies, delusions or mistakes itself implies the possibility of truth about a matter.

Furthermore, there is a clear difference between colours hallucinated and real colours, a difference which the person hallucinating is often aware of. There is also a difference between a jumper which only looks black in red light and one that always looks black. The second jumper is "really" black while the first one is "actually" green but appears to be black under these unusual conditions.

There are of course cases where it is difficult to establish the real colour - a shirt may have a strange colour somewhere between purple and brown but never clearly one or the other (I have seen such a shirt), and there are of course creatures like chameleons

which do not seem to have any "real" colour. Neither the shirt nor the chameleon, however, is yellow with black and pink stripes, and our curiosity about these exceptions furthermore shows that we expect objects to have certain and easily determinable colour.

#### 4.3. Conclusion

Although redness like any object (qua intentional object of a subject) epistemologically depends on a subject, ontologically the following is the case:

1. Colours remain more or less constant over time.
2. There is a difference between real colours and colour illusions.
3. Colours causally interact with other properties.

I therefore conclude that colours exist independently from observers, even though they are nevertheless epistemologically bound to observers. That they are bound to perceivers not just in the sense that if no-one had ever seen a colour (if we were all blind) I could not have known that colours existed and could not have investigated the nature of colour, but also because their internal relations as reflected by our colour concepts are determined by human thought, will be further argued for in part II.

## COLOURS AS IDEAL OBJECTS

There are two ways in which we might refer to a metaphysical realm of colours: We can either propose a Platonic realm of the colours themselves, or we can suggest that although there may not be Platonic Ideas of colour, statements about colour can nevertheless have the status of Fregean Thoughts and hence be objectively true. The first (Platonic) option is more interesting to me as it is particularly about colour. One might, for instance, ask whether there are Platonic Ideas of each and every colour or just of primary colours or even of colour as such.

With regard to Fregean Thoughts on the other hand, I see no reason why there should not be Fregean Thoughts about colour if there are Fregean Thoughts at all. Thus Frege's beautiful metaphor can easily be transferred to colour: "The thought, not sensory itself, clothes itself with the sensory cloak of the sentence and can thus be grasped (more easily). We say, the sentence expresses the thought."<sup>1</sup>

Similarly truths about colour may "clothe themselves" in colourful appearances such as rainbows, coloured shadows and similar appearances seemingly made for our easier grasping of colour relations. The question whether there are Fregean Thoughts and what their existence entails, however, has no place in this thesis, and I shall therefore concentrate on Platonic Ideas of colour.<sup>2</sup>

Rather than referring to Plato himself, I shall base this enquiry on Schopenhauer's "Platonic Ideas". Although Schopenhauer does not refer to Platonic Ideas of colour in his work *Über das Sehnen und die Farben*, he does so in *Die Welt als Wille und Vorstellung* when he writes about art. I shall argue that Schopenhauer's Platonic Ideas and Goethe's Urphenomena have much in common and can be united into a useful concept for the understanding of painting.

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<sup>1</sup> "Der an sich unsinnliche Gedanke kleidet sich in das sinnliche Gewand des Satzes und wird uns damit fassbarer. Wir sagen, der Satz drücke einen Gedanken aus." ("Der Gedanke", 1986, p.33)

<sup>2</sup> As it turns out the most useful concept of Platonic Idea of colour requires a minimum of colour "syntax"; this makes it closer to a Fregean Thought than might be expected.

Metaphysical colours<sup>3</sup> can take two forms: they can either be objects in the sense used so far, i.e. in principle knowable to a subject, or they can be like Kantian things in themselves and hence neither knowable nor to be discussed. Schopenhauer makes use of both: His Platonic Ideas are objects for us subjects. As they are objectifications of Will (thing in itself), it may be assumed that like other forms of Will they can also act on us directly (i.e. not as coloured objects). This notion is quite obscure as it makes the Will into the subject and us into objects. It does, however, explain, why colours in this sense evade analysis (provided they exist): analysis is by nature directed at objects, but direct expressions of the Will, just as the Will itself, are not part of the world as representation and hence cannot be grasped as objects. Because of this difficulty, I shall concentrate on Schopenhauer's notion of Platonic Ideas, which are part of the world as representation. But I do add a short section on colour as "expression of the Will" at the end.

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<sup>3</sup> I use the expression "metaphysical colours" to keep the term open for more specific categorisation into "metaphysical colour objects", "Platonic Ideas of colour", "Colours in themselves" etc.

## 1. Schopenhauer's Platonic Ideas

I do not try to judge whether Schopenhauer's Platonic Ideas are truly Platonic or not.<sup>4</sup> Schopenhauer himself writes that he follows the Platonic goal but not in Plato's footsteps.<sup>5</sup> The notion of "Platonic Ideas" is especially used in Schopenhauer's third book of *Die Welt als Wille und Vorstellung*: "Second Observation on the World as Representation: Representation independent of the Principle of Sufficient Reason: The Platonic Idea: The Object of Art"<sup>6</sup>.

Schopenhauer's Platonic Ideas must be distinguished from Kantian things in themselves on the one hand, and from concepts on the other. All three of these exist outside space and time. The Kantian thing in itself is unknowable, however, while Platonic Ideas and concepts can be known. Plato himself is not clear about the distinction between concepts and Ideas, but Schopenhauer claims that it consists in the following: Concepts are abstractions from the empirically known. They are formed in our understanding (Vernunft)<sup>7</sup>. These representations (usually words) are necessarily poorer than the originally seen, as many details have to be omitted in a concept. Schopenhauer does not negate the importance of concepts for the sciences and for philosophy, but he shows that like Kant he thinks that concepts without intuitions (Anschauungen) are empty. So while concepts and Ideas can both be grasped in visual (and to a lesser extent also other) perception, concepts are known only through their limits as expressed in their definitions. These, like borderlines, make them into forms, i.e. "sterile (i.e. contentless) receptacles".

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<sup>4</sup> For contrary views on this matter please refer to Hilde Hein (1966) and James Chansky (1988).

<sup>5</sup> WWVI, §49, p.328.

<sup>6</sup> "Der Welt als Vorstellung zweite Betrachtung : Die Vorstellung, unabhängig vom Satze des Grundes: Die Platonische Idee: Das Objekt der Kunst" (chapter heading, WWVI, p.243)

<sup>7</sup> Schopenhauer is not very explicit about this process. He devotes a whole chapter of the *Fourfold Root* on this topic (VWZG, §§26-34) and a good half of the first book of WWV. The form in which concepts are linked is the second root of the principle of sufficient reason, but how exactly the abstraction process from empirical perceptions works is not clear.

## 1.1. Specification of Schopenhauer's Platonic Ideas

To understand Schopenhauer's view of Platonic Ideas we must remember his view of nature as a "Stufenfolge" - a hierarchical series of steps from inorganic matter to human beings. This Stufenfolge, unlike that of Goethe or of Hegel, does not entail progress or development: Since the Will is not part of the principle of sufficient reason it does not undergo change, least of all "reasonable" change towards the better. Hence Schopenhauer's Platonic Forms, as objectifications of the Will, do not change or develop either:

"[the Will] does not tire, age, or learn, does not perfect itself through practice, is in the child the same as in the old man: always one and the same, and in character unchangeable in each of them."<sup>8</sup>

Each species represents certain aspects of the Will more or less strongly, which we recognise (erkennen) in the way each of them partakes of some Ideas more than of others (the Ideas being especially characteristics such as lightness, swiftness, etc., so that a swallow has more swiftness and lightness than an elephant but both partake of weight and speed). The following paragraph summarises best what Schopenhauer means by "Platonic Idea":

"rather, the Idea is the immediate and thus adequate objectivity of the thing in itself, which itself however is the *Will*...The Platonic Idea... is necessarily object, a known, a representation, and only thereby different from the thing in itself. It has only put aside the subordinated forms of appearance...; but the first and most general form it has kept, the form of representation as such, of objectivity for a subject...Therefore it alone is the most *adequate objectivity* of the Will or the thing in itself, is itself the whole thing in itself, just under the form of representation."<sup>9</sup>

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<sup>8</sup> "[der Wille] ermüdet nicht, altert nicht, lernt nicht, vervollkommnet sich nicht durch Übung, ist im Kinde was er im Greise ist: stets einer und derselbe und sein Charakter in jedem unveränderlich." (WN, "Physiologie und Pathologie", p.350)

<sup>9</sup> "vielmehr ist uns die Idee nur die unmittelbare und daher adäquate Objektivität des Dinges an sich, welches selbst aber der *Wille* ist.....Die Platonische Idee...ist notwendig Objekt, ein Erkanntes, eine Vorstellung, und ebendadurch, aber auch nur dadurch vom Ding an sich verschieden. Sie hat bloß die untergeordneten Formen der Erscheinung..abgelegt...;aber die erste und allgemeinste Form hat sie beibehalten, die der Vorstellung überhaupt, des Objektseins für ein Subjekt... Daher ist auch sie allein die möglichst *adäquate Objektivität* des Willens oder Dinges an sich, ist selbst das ganze Ding an sich, nur unter der Form der Vorstellung." (WWVI, §32, pp.252-253)

So, Schopenhauer's Platonic Ideas have the following qualities:

1. As object they are necessarily object and
  - thus object for a subject
  - hence knowable in the form of representation.
  
2. As representation they are
  - the whole thing in itself
  - the first and most general form
  - the form of representation as such,  
i.e. the ideal representation of the world as representation.
  
3. The subject that knows such an object is
  - therefore the purest subject possible
  - hence free from Will.

### 1.2. Goethe's Phenomena as Platonic Ideas

I shall use this list as a checklist to see if Goethe's phenomena fulfil the requirements of being Platonic Ideas in Schopenhauer's sense:

1. "As object they are necessarily object and thus object for a subject and knowable in the form of representation".

Goethe's phenomena are necessarily object as they exist *for* our senses and hence for human subjects.<sup>10</sup> Also, they are knowable in the form of representation: Goethe's insistence that "we are meandering in the realm of pictures" as well as his constant emphasis on white and black as representatives of light and dark should be sufficient evidence of his conviction on this matter. If one wanted to argue for something closer

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<sup>10</sup> "Colour is a law of nature *in relation with* the sense of sight."  
"..die Farbe sei die gesetzmäßige Natur *in bezug auf* den Sinn des Auges"  
(Fl. Introduction p. 324; Eastlake p.liv; my italics)

to Schopenhauer's sense of representation ("Vorstellung") one would have to emphasise the passages in which Goethe speaks of seeing as theorising and perhaps neglect Goethe's more realist passages, but altogether Goethean phenomena and Schopenhauer's Platonic Ideas are at least compatible in their status as objects.

2. "As representation they are the whole thing in itself, the first and most general form, the form of representation as such, i.e. the ideal representation of the world as representation."

If we neglect the hierarchy of phenomena and concentrate on Urphenomena alone, then these are certainly the "first and most general form". They are the "form of representation as such, the ideal representation of the world as representation" in that once one has reached them one can descend from them and understand all other, lower phenomena.<sup>11</sup> As to it *being* "the whole thing in itself", Goethe's holistic Weltanschauung is built on the belief that the whole of nature shows itself in each phenomenon. In this sense it is indeed possible that each phenomenon is the whole thing in itself. It may not seem obvious how even the fullest possible understanding of colour phenomena can explain how a tree grows or why a dog barks. However, modern science too relies on such a close knitted and consistent system of physical laws that if one fully understands one aspect of physics and is able to trace it back to its axioms then one is indeed able to deduce the whole of physics from that one beginning.<sup>12</sup>

3. "The subject that knows such an object is therefore the purest subject possible and hence free from Will".

I shall discuss the epistemology of grasping Platonic forms on the next few pages, but for now let it suffice that Goethe would probably disagree with Schopenhauer on this point. If one translates Schopenhauer's notion of the Will into Goethe's notion of energy (see below) then in Goethe's pantheist philosophy the grasping of a Platonic Idea or Urphenomenon would entail the unity with energy/Will rather than the freedom from it.

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<sup>11</sup> Fl.§175; see also Wittgenstein: the "Urbild" determines our investigations not the other way round (C&V p.469, for full quotation see footnote ch.IV, sect.2.6)

<sup>12</sup> Something similar seems to be implied in Wittgenstein's remark: "I can imagine a logician who tells us that he has now succeeded in *really* being able to *think*  $2 \times 2 = 4$ ." - "Ich kann mir einen Logiker vorstellen, der erzählt, er sei jetzt dahin gelangt, " $2 \times 2 = 4$ " wirklich *denken* zu können." (R.C. I,69, III,109)

### 1.3. Grasping Platonic Ideas: An Epistemological Problem

Platonic Ideas have the important role of determining the truths of classifications. Thus a fish is only a fish if it partakes of the idea *fish* and a colour is only a colour if it partakes of the idea *colour*. Grasping a Platonic Idea is thus grasping the essence of a thing. If we imagine the essence of redness to exist in some sort of Platonic realm of Ideas it is, however, difficult to see how we are able to reach this essence. Plato himself solved this problem by reference to the rebirth of souls and recollection of Ideas, so that the grasping of Ideas for Plato is a mere re-awakening of knowledge already within us - a process more plausible than a sudden leap from mere sensory perception to the grasping of metaphysical essences.

If one does not believe in Platonic myths, however, the problem of how to bridge the gap between everyday perceptions and Platonic Ideas remains puzzling. One solution to the problem can be found in von Weizsäcker's interpretation of Goethe's *Urphenomena*.<sup>13</sup> For Weizsäcker the *Urphenomenon* is "the appearing idea" and thus is itself a connection of subject and object, ideal and real (HA13, p.552). That an appearance by nature involves subject and object can be seen when we imagine an appearance without subject or object: without subject it cannot be an appearance as it then does not appear to anyone (the famous tree falling in a forest when no one is watching). Without object, on the other hand, the appearance is an illusion, and this is precisely the point at issue: given that there are Platonic Ideas of colour an appearance of colour will only be a genuine appearance of colour if it partakes of a (or the) Platonic Idea of colour. Otherwise it is an illusion. This means that only if the real appearance and the ideal phenomenon or Platonic Idea are recognised as united can we (as subjects) get to know the truth about the appearance (object). Goethe and Schopenhauer give different accounts of this process, which I shall treat individually in the next two sections.

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<sup>13</sup> "Einige Begriffe aus Goethes Naturwissenschaft" (HA13, pp.540-555)

Another solution is to suggest divine intervention: As in Zajonc's interpretation of Goethean *Urphenomena* one could argue that a Platonic Idea or *Urphenomenon* is a divine idea which can manifest itself both as a natural phenomenon and as a concept. Because I want to exclude religious matters from this thesis, however, I shall exclude Zajonc's interpretation. Yet I think that it is a valid interpretation of Goethe's texts which is furthermore supported by A.Schöne (1987) and Franz (1932).

## 2. Goethe's Epistemology

Goethe is well aware of the "abyss" between experience and idea.<sup>14</sup> It seems impossible to unite what is in time and space with what is timeless, and to try to do so may lead to madness (ibid.). Thus the opposition between the experienced and the "ideaed" ("Ideiertes") must be resolved if the two are to be united.

As there is a hierarchy of phenomena and as the lowest level of phenomena can be grasped in daily manifestations, what we need to do is to train our senses. By this Goethe means that we need to learn to recognise what is relevant in an appearance and what is not until our senses (both our sensory organs and our minds) are good enough to recognise an Urphenomenon. We climb the ladder up to the Urphenomena taking jumps from one level to the next as we follow the basic principles of analysis and synthesis. Synthesis is the creative method by which we can jump a step while analysis gives us a solid foundation on each level. Only if both are in balance can we reach the Urphenomena. While analysis like the chemical analysis of substances is a clear enough concept, it is the synthesis that requires further explanation.

### 2.1. Goethe and Kant: Contemplative Power of Judgement

In his essay "Anschauende Urteilskraft" ("Contemplative power of judgement") Goethe quotes §77 of Kant's Critique of Judgement to propose that besides our discursive reason (intellectus ectypus), which works inductively from analysis, we might have the power of intuitive reason (intellectus archetypus), which is synthetic and deductive. Goethe interprets Kant to take the intuitive intellectus archetypus as God's reason and proposes human reason to partake in it - just as according to Kant it partakes in morality through belief in God, virtue and immortality.

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<sup>14</sup> See "Bedenken und Ergebung" (HA13, p.31).

Goethe's process of partaking can be taken quite literally as the participation in an event (remember that for Goethe "In the beginning was the deed"). If Goethe is a true pantheist so that God *is* living nature, and if we as human beings are part of living nature, then we as human beings are part of God.<sup>15</sup> And as nature is organised in steps (Goethe's "Stufenfolge") we ourselves rise a level each time we recognise something on a higher level because in the process of contemplating something higher we ourselves partake of a higher level. Although this sounds quite mystical it is consistent. Furthermore, it complies with Schopenhauer's notion of only a genius being able to grasp Platonic Ideas, as Platonic Ideas (or Urphenomena) are at the highest level and thus take the highest level of human being to grasp it (see below).

## 2.2. Knowledge by analogy<sup>16</sup>

A second notion used by Goethe to overcome the abyss between real appearances and ideal phenomena is that of analogy: instead of having to explain something as it is on its own level we can show by analogy what it means on a level more familiar to us.<sup>17</sup>

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<sup>15</sup> I make this point without wanting to say that Goethe was a pantheist in one sense or another. The exact form of Goethe's religious beliefs is not of any consequence to his *Farbenlehre*. What is important is that Goethe believes in something higher than what can be experienced by our sense organs - "Call it bliss! Heart! Love! God!" - "Nenn's Glück! Herz! Liebe! Gott!" (*Faust I*, line 3454).

<sup>16</sup> In his excellent paper "The Theory of Colour as the Symbolism of Insight" (in Amrine et al, 1987) Christoph Gögelein proposes an "analogy between the way in which colour appears (ie. the content of the theory of colour) and the way in which Goethe understands insight (ie. the act of cognition)" (p.247). Defining analogy as "identity of relationships" (p.248) Gögelein equates the relationships of the following pairs: idea and light, condition and darkness, Urphenomenon and colour, phenomenon and turbidity, conceptual mode and eye.

Although Gögelein points out many interesting parallels in these pairs I do not want to use his model. The reason for proposing my own model instead is that I want to stress the dynamic process more than he does. Thus I do not set light as the highest principle but rather begin with the polarity between light and darkness. Nevertheless there are good arguments for Gögelein's interpretation - not least its even closer parallel to Plato.

<sup>17</sup> In order to translate from one language into another we first have to analyse the original text (our object in this world of representation) and then synthesize it into a new text (in a different world of representation). This translated text is strictly speaking analogous to the first text: it reaches for the same meaning, the Platonic Idea of the first text, albeit by a different route, namely through a different language.

If it is by analogy that we translate appearances into phenomena, the balance of the roles of analysis and synthesis may change as they do in translations of texts<sup>18</sup>: At the level of empirical phenomena we almost exclusively rely on our senses (which are mostly analytical forces of our understanding (Verstand)), while at the stage of scientific phenomena synthetic thought is required to create the experiments whose results we then again perceive by our senses. Finally, at the stage of pure phenomena our power of synthesis does most of the work and the appearance which triggers our thoughts is but of little analytical importance. So, the higher we climb the ladder of phenomena the more synthetic thought is needed because similarities between appearances are less easily seen.<sup>19</sup> (Here we also find another similarity with Plato: the realm of visible objects, the realm of mathematical (today also physicist) knowledge, and the realm of pure forms.)

### 2.3. Criticism of Goethe's Epistemology

There are two main problems regarding Goethe's epistemology: it is very general and it lacks an account of the recognition of similarity. We cannot learn by analogy nor use synthetic creativity unless we have the concept of similarity, which is required for the recognition of common aspects in different appearances. So I shall begin with an account of Goethe's understanding of similarity.

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<sup>18</sup> The process of translation is itself more or less analytic or synthetic depending on the kind of text we translate: a scientific text can easily be analysed into key concepts and then translated into other languages, while a poem will require synthetic creation by the translator to make it into a new piece of art. Other analogies, such as paintings or metaphors require an even more synthetic understanding to make them meaningful in new cultural contexts (worlds of representation).

<sup>19</sup> Remember that the Urphenomenon can be grasped in a wide variety of appearances many of which will have little in common at first sight.

a) The recognition of similarities

According to Goethe, polarity is the form of all Urphenomena in nature. Polarity logically demands unity as its opposite.<sup>20</sup> Similarity can be defined as a degree of unity between absolute opposition and identity (thus red is similar to orange but not similar to green). As human beings we are part of nature and hence partake both of polarity and unity to varying degrees. Hence we also partake of similarity (as in the case of family resemblance, for instance).

If this sounds obscure, one has to remember that according to Goethe we are part of living nature and not parts of machines. As nature goes through certain processes, we go through the same processes ourselves. This is most striking in Goethe's account of colour vision: as we see colours in the external world, our eyes produce complementary colours and thus complete the colour circle (i.e. through polarity (complementary colours) our eyes achieve unity (the complete colour circle)). We are not passive receivers of nature's phenomena like scientific instruments are, but take an active part in the process of colour creation.

Now, our eyes by creating the opposites of the colours that appear in nature complete the very same colour circle that is created in nature (even if in mirror image). So unlike most dualist accounts Goethe does not have to explain how outer appearances reach the inside of our heads, but only how we recognise similarities within us. It is much more intuitive that we should recognise similar aspects or events happening within us than outwith us. Indeed, Goethe denies that any living thing can be grasped by something outside it:

"A living existing thing cannot be measured by anything outside itself, but were this yet to happen it would have to provide the yardstick for itself; this however, is within the mind ("höchst geistig" - "mentally/spiritually highest") and cannot be found by the senses."<sup>21</sup>

If our minds, rather than our eyes, complete the colour circle then this is indeed a case where nature has given us an appropriate yardstick for colour within us. Additionally, we have the outer world to refer to through interaction with other people.

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<sup>20</sup> See ch.III, sect.2 for details.

<sup>21</sup> "Studie nach Spinoza", HA13, pp.7-8.

To explain in detail how we see that two colours are similar, if we reject explanations from intuition (our inner yardstick) or recollection, may be a task for psychologists rather than philosophers,<sup>22</sup> but I do think that Goethe's account is philosophically satisfactory.

b) The problem of generality

There still remains the problem of generality: Goethe's explanation of everything by reference to polarity (internal and external, ideal and real, subjective and objective) seems so simple and general a solution that we could prove almost anything by it. But this is precisely what Goethe is trying to do: As a holistic philosopher he wants to explain the whole of nature rather than just some little part of it. And as the principle of polarity can be applied on all levels in increasing detail we may use it to explain one particular appearance, the whole of the colour circle, or even the interaction of colour with other phenomena.

The explanatory value of Goethe's *Farbenlehre* will I hope become more apparent when I explain individual truths about colour in part II. There you will see how the same process can be meaningfully applied on all levels. If this process really works then there is no reason to think that its simplicity itself is a weak point.

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<sup>22</sup> See also Wittgenstein, *Philosophical Investigations* §377.

### 3. Schopenhauer's Epistemology

#### 3.1. The Anticipation of Platonic Ideas

It is essential that for Schopenhauer Platonic Ideas are not known a priori (as H.Hein (1966) thinks they are). As Chansky (1988) correctly points out (p.70) they would then be mere forms. But Ideas in Schopenhauer's sense are more like pictures than like forms: they have a content which can be seen, albeit only by the activity of a genius. The reason why it takes a genius to grasp these Ideas is that although they are forms of representation and hence in principle available to our senses, they never appear in their pure form in the world of representation around us. Instead, Platonic Ideas have generative powers which can only work on, so to say, the fruitful soil of the mind of a genius: Platonic Ideas are generative completions of something which empirically is only half there.

Schopenhauer introduces the notion of "anticipation" for the activity of the genius who "sees" Platonic Ideas in nature. Unlike concepts we do not grasp Platonic Ideas *after* we have seen so and so many things from which we then abstract in order to form concepts, but instead we *anticipate* Ideas. The odd thing about the anticipation of Platonic Ideas is that it cannot be described ("put into concepts") but must be understood immediately. Perhaps this is the reason why some critics find Schopenhauer's notion of Platonic Ideas so "eccentric" and "paradoxical" (P.Gardiner, 1963) or in the end "not very important" (H.Hein, 1966). Yet I think that the concept of "anticipation" makes sense. One might draw a parallel to situations where one is able to complete the sentence of another person. When this happens one anticipates what the other was going to say, and one therefore anticipates the other person's idea before one has the empirical evidence for it.

Platonic Ideas are ideal not just in the sense that they do not appear in their full form, but also because they each represent only one force of the Will. As they are therefore not under the influence of other forces of the Will than the one which they objectify (makes visible to us) - they are pure representation. And this is the second reason why we need to anticipate Platonic Ideas rather than passively conceive them: in the contemplation of Platonic Ideas we anticipate what nature would have created were

she not hindered by opposing forces of the Will - in a crude sense we thus see the world before it was messed up by the Will.

"For how is the artist to recognise in nature the successful work which is worthy of representation and find it among the failed ones, unless he anticipates beauty *before experience*?"<sup>23</sup>

### 3.2. The contemplation of Platonic Ideas in Art

Sometimes Goethe seems to say that phenomena are laws of nature "frozen" in lasting appearances. This may bring us dangerously close to the madness Goethe warned us about (especially when one tries to visualise how the fleeting phenomenon sails through the air until it is grasped by some plant or glass). It is perhaps for this reason that Schopenhauer moves away from Urphenomena in nature and instead places his Platonic Ideas in art:

According to Schopenhauer, Platonic Ideas are most easily perceived in aesthetic contemplation because (good) artists are able to depict things more purely than they naturally appear. There are two sides to aesthetic contemplation: the object as Platonic Idea and the knowing, pure, will-less subject (WWVI, §38). Art is the one way of contemplating things independently from the principle of sufficient reason (WWVI, §36): In art we do not ask for the sufficient reason of a piece of art (the Why and Whither) but just what it is. So, in artistic creation and contemplation the knowing and the known are no longer distinct in the sense that there might be a causal chain leading from the piece of art to the eye of the beholder, but knower and known become pure subjectivity and objectivity: pure representation as "the other side" of pure Will (§34).

The possibility of pure representation is necessary because ontologically the Will, or thing in itself, alone *is* (§35). As the Will manifests itself in nature it does so in different forms, which struggle to be dominant over each other (so that in each of them several forces exist, but none of them purely). Because in every living being different

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<sup>23</sup> "Woran soll aber der Künstler ihr [der Natur] gelungenes und nachzuahmendes Werk erkennen und es unter den mißlungenen herausfinden; wenn er nicht *vor der Erfahrung* das Schöne antizipiert?" (WWVI, §4, p.31)

forms co-exist and compete with each other (lightness, strength, fluidity etc.) there are therefore no perfect living *beings*, and we need art "to see in the things not what nature has really formed but what she endeavoured to form".<sup>24</sup>

So when a genius (be he artist or philosopher) seeks to find "what nature endeavoured to form" he does so

"by finding (knowing) in the individual thing its *Idea*, and so to say *understanding nature's half-spoken words* he expresses purely what she only stammers; he moulds into the hard marble the beauty of the form which she fails to create in a thousand efforts, and he places it in front of nature, almost as if calling to her: "This is what you were trying to say!", and "Yes, that's what it was!" echoes the true connoisseur"<sup>25</sup>

"This anticipation is the *Ideal*: it is the *Idea* in so far as it is at least half known (erkannt) and in so far as it meets the a posteriori given by nature in a complementary way, which becomes practical for Art. The possibility of such anticipation ...lies in the fact that artist and connoisseur are the in-itself of nature, are themselves the Will objectifying itself. For only by something alike, as Empedokles said, can the alike be known."<sup>26</sup>

### 3.3. Schopenhauer and Goethe Reunited

Goethe uses the Empedokles saying as a leading principle for his *Farbenlehre*;<sup>27</sup> furthermore Goethe's search for Urphenomena in his other scientific writings fits Schopenhauer's description of someone looking for a perfect form - a Platonic Idea - in nature. In this light we may now agree with Schiller who famously said to Goethe that what Goethe was looking for in his search for an "Urplant" was not a plant but an idea.

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<sup>24</sup> "um in den Dingen nicht das zu sehen, was die Natur wirklich gebildet hat, sondern was sie zu bilden sich bemühte" ( WWVI §36, p.267).

<sup>25</sup> "indem er im einzelnen Dinge dessen *Idee* erkennt, gleichsam die *Natur auf halbem Worte versteht* und nun rein ausspricht, was sie nur stammelt, daß er die Schönheit der Form, welche ihr in tausend Versuchen mißlingt, dem harten Mamor aufdrückt, sie der Natur gegenüberstellt, ihr gleichsam zurufend: "Das war es, was du sagen wolltest!" und "Ja, das war es!" hallt es aus dem Kenner wider." (WWVI §45, pp.313-4)

<sup>26</sup> "Diese Antizipation ist das *Ideal*: es ist die *Idee*, sofern sie, wenigstens zur Hälfte, a priori erkannt ist und, indem sie als solche dem a posteriori durch die Natur Gegebenen ergänzend entgegenkommt, für die Kunst praktisch wird. Die Möglichkeit solcher Antizipation...liegt darin, daß Künstler und Kenner das An-sich der Natur, der sich objektivierende Wille selbst sind. Denn nur vom Gleichen, wie Empedokles sagte, wird das Gleiche erkannt." (WWVI §45, p.314)

<sup>27</sup> "Wär nicht das Auge sonnenleich..." (Fl.Einleitung, HA13, p.324; Eastlake introduction p.liii)

The Urphenomenon is indeed a Platonic Idea in the Schopenhauerian sense. Like Schopenhauer's Ideas, the Urplant can be *seen*, is thus object to a knowing subject, but at the same time has to be created, for there is no such pure form in nature herself.

In order to see a Platonic Idea or Urphenomenon in nature we have to disregard the powers of will on the actual thing and on us. If, for instance, I want to see a pure red on a rose, I have to disregard shadows and other colour-related characteristics as well as the smell of the rose which I may like or dislike. So I should not be interested in the actual rose at all, but only in its ideal features - in what it endeavours to be. The Urplant should thus be visible in the rose just as much as in a fir tree, and a pure red should be the same in a rose, a book or in a colour chart. In other words, Urplant and pure redness are the pure forms independently from their causes of existence in that particular object.

We can now interpret Goethe's Urphenomena to fit them into a more sophisticated philosophical framework: Goethe, the artist, *sees* the colour circle both in nature and in pieces of art. His own diagrams of the colour circle are what Schopenhauer says Art should be: "Her one origin is the knowledge of the Ideas; her one aim communication of this knowledge."<sup>28</sup> For the world of representation this means: "If the whole world as representation is only the visibility of the Will, then Art is the clarification of this visibility."<sup>29</sup>

In this sense Goethe is an artist - a Kenner und Künstler.<sup>30</sup> For Goethe too writes that "nature speaks to us in various tongues" and "however manifold, complicated, and unintelligible this language may seem to us, yet its elements remain ever the same"<sup>31</sup> (namely Platonic Ideas). As art shows the *what*, rather than the *why* or *how* or *whither*, it lets the thing speak for itself (WWVII, §17). One could therefore say that when Goethe does not produce a theory of colour in his *Farbenlehre* he works as

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<sup>28</sup> "Ihr einziger Ursprung ist die Erkenntnis der Ideen; ihr einziges Ziel Mitteilung dieser Erkenntnis" (WWVI §36, p.265)

<sup>29</sup> "Ist die ganze Welt als Vorstellung nur die Sichtbarkeit des Willens, so ist die Kunst die Verdeutlichung dieser Sichtbarkeit" (ibid, p.372)

<sup>30</sup> Literally a "Kenner" is someone who knows by personal experience, and a "Künstler" someone who is able.

<sup>31</sup> "so mannigfaltig, so verwickelt und unverständlich uns diese Sprache scheinen mag, so bleiben doch ihre Elemente immer dieselben" (Fl. Vorwort, p.315; Eastlake, preface, p.xxxviii)

an artist: he just shows what colours are. (This in itself is a major achievement and one might even argue that it is the only achievement ever possible.)<sup>32</sup> Schopenhauer, however, interprets Goethe like a Platonic interpreter interprets an inspired poet: he shapes Goethe's insights into philosophical concepts and focuses them in his "tip of the pyramid".

This process is necessary (in Schopenhauer's view) in order to facilitate the correct interpretation of Goethe's writings. Like any piece of art the *Farbenlehre* too is bound to the world of representation by its physical form (as a book). So while Goethe has made colour phenomena visually accessible to similar minded people and while he himself found Platonic Ideas of colour, the *universalia ante rem*, through his ingenious insights into nature, Schopenhauer sees his own task in defining the *universalia post rem*, in order to make Goethe's phenomena philosophically communicable and valuable. So what Schopenhauer seeks are the suitable philosophical concepts. And "philosophy [is] nothing other than a complete and correct repetition and expression of the essence of the world in very general concepts."<sup>33</sup>

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<sup>32</sup> See my chapter on Wittgenstein

<sup>33</sup> "...die Philosophie nichts anderes ist als eine vollständige und richtige Wiederholung und Aussprechung des Wesens der Welt in sehr allgemeinen Begriffen" (WWVI §52, p.368)

#### **4. Colours as Platonic Ideas**

Independently of Goethe and Schopenhauer and assuming that there are at least some Platonic Ideas (such as Ideas of tables, chairs, goodness and justice), there are three possibilities regarding the number and kind of Platonic Ideas of colour: Every single shade of colour could be an exemplification of a particular Platonic Idea; or there might be no Platonic Ideas of colour at all; or there could be some Platonic Ideas of colour but not every shade of colour would have its own Platonic Idea.

##### 4.1. There are no Platonic Ideas of colour

In order to investigate this possibility let us assume that there are Platonic Ideas of tables, beds, goodness, justice and so on, but no Platonic Idea of colour or individual colours. This would imply that colours belonged exclusively to the world of appearance and that we could only have opinions about them but no true knowledge of them. This raises the immediate objection that certain statements about colour, such as about the mutual exclusion of red and green or about yellow being lighter than blue, seem to be eternally true and cases of genuine knowledge. And even the obvious fact that pillarboxes are red seems to imply that they partake of the Platonic Idea of redness. Yet the view that we might be deluded into thinking that colours truly exist whereas colours are really just like the shadows in Plato's cave and truths about colour only distract us from the real truths, is consistent with the Lockean view that colours are mere secondary qualities and is hence frequently held in modern philosophy.

Provided that there are other Platonic Ideas, however, this view requires further explanations, which depend on the status granted to Platonic Ideas: If Platonic Ideas are taken to explain our concepts, i.e. to explain what it is that all things called "X" have in common, it would be inexplicable how we could form colour concepts at all if there were no corresponding Platonic Ideas. So if we want to deny the existence of Platonic Ideas of colour we need to deny the stronger claim that Platonic Ideas have some sort of primary metaphysical existence. Thus we need to assume that it is possible to have perfect forms of beds and tables without having perfect forms of colour. This is plausible when one thinks of the difficulty attached to picking the "perfect" shade of

blue out of a large number of blue samples. But even if colours may not have Platonic Ideas of their own, they seem to be part of other Platonic Ideas. Thus it is difficult to believe that there could be perfect forms of daffodils, bluebells or strawberries which were not yellow, blue or red. One might argue that colours are always properties of things and hence that while they may be included in the Platonic Ideas of objects they do not have Platonic Ideas of their own. So unlike goodness or justice, which may be instantiated in good or just people and actions but also and more importantly each have their own perfect form independently of these instantiations, colours would exist only in conjunction with other forms and their instantiations. This leads to difficulties related to Platonic Ideas being simple or complex and to possible interrelations between complex Ideas, difficulties which would lead too far astray. So for now I shall assume that it is at least possible for there being no Platonic Ideas of colour or colours, but that colours could still play a role in complex Platonic Ideas of objects and natural kinds. (interestingly this could lead to a Wittgensteinian emphasis on context: Thus the perfectly red tomato will be of a different shade of red from the perfectly red apple, strawberry or rose.

#### 4.2. Every single colour has its own Platonic Idea

The opposite solution is to propose Platonic Ideas for each and every single colour. This would make Platonic Ideas nothing more than universals in the most minimal sense: what two objects of exactly the same shade of blue have in common is precisely that shade of blue. But if there was a Platonic Idea for every single colour we ever encountered and if Platonic Ideas had no further structure, then it would be difficult to understand how we could ever grasp that two different shades of colour may yet be of the same colour (dark and light blue, for instance). Platonic Ideas of colour are only useful if general concepts such as redness or blueness can be understood through them. This may or may not make the infinite number of Platonic Ideas of single colours (the minimal universals) redundant, but it requires at least a hierarchy or classification among these Platonic Ideas.

I conclude that although some conceptions of Platonic Ideas require every colour to have its own Platonic Idea, this does not offer a sufficient explanation for our grasping of colour concepts, and this, after all, is the purpose of Platonic Ideas in the first place ("what makes knowledge possible").

#### 4.3. There are some Platonic Ideas of Colour

I therefore favour the third option: In order to make use and sense of the notion of Platonic Ideas of colour we require these Platonic Ideas to be of epistemological value to us. They must therefore offer insights into the structure of colour itself and/or into the relation between colours and other things and properties. An obvious solution would therefore be to propose that only primary colours (and black and white) are Platonic Ideas, and that all colour appearances are more or less good exemplifications of these Ideas. As I will show in chapter VII, however, the notion of primary colour is not as simple as it may seem - there are at least three good and useful notions of primary colour, each of which would require a different set of Platonic colour Ideas. It might therefore be more useful to take the complete colour sphere as the one Platonic Idea of colour: once grasped it yields understanding of most colour relations, and one could shift the proportions occupied by each colour on the sphere (their quantitative relations) according to purpose, and still retain the same qualitative colour relations.

If the colour sphere was the one and only Platonic Idea of colour, the grasping of Goethe's Urphenomena or Schopenhauer's Platonic Ideas would reveal such a significant part of the sphere that its whole could thus be grasped. In this sense Goethe's Urphenomena and Schopenhauer's Platonic Ideas would be genuine appearances of Ideas as they would unite the object (Platonic Idea) with the subject (perceiver). While Schopenhauer would only allow for one eternally stable Platonic Idea, namely one in which yellow was placed opposite purple, the proportions on Goethe's sphere could change depending on context. While Schopenhauer is thus closer to Plato's original conception of a Platonic Idea, Goethe is closer to understanding the nature of colour

itself.<sup>34</sup> In other words: Goethe remains a realist and Schopenhauer an idealist even when they appear to refer to similar Platonic entities.

## **5. Colours as Objectivation of the Will**

I shall conclude this chapter about the metaphysical objectivity of colour with a short section on the metaphysical subjectivity of colour. By "metaphysical subjectivity" I do not mean those properties of colour which are subjective to us (for I do not think that it makes sense to speak of such properties as metaphysical when they are so clearly grounded in the individual subject) - but instead I mean the extreme case when we are no longer subjects observing colour objects but become the object of colour. This can only be possible in a dualist system in which there is a realm which is completely independent of us human beings and cannot be grasped by us (hence cannot become object to our senses or reasoning powers). Schopenhauer's Will is such a realm. While I cannot possibly discuss the consistency and feasibility of Schopenhauer's notion of the Will as a whole, I hope to show nevertheless that colours as powers of the Will are a strange but not altogether useless or easily discarded concept.

### 5.1. Will and Energy

Even if all our seeing is the creating of pictures, we still make a clear distinction between seeing after-images and seeing coloured objects. Our deep knowledge that there is more to the world than a picture in our eyes is, as Schopenhauer correctly says, a deep metaphysical understanding: for Schopenhauer it is the will in nature which we sense other beings to share with us, for Goethe it is energy. Using the notion of energy Goethe explains how we can have an image after the actual object of perception has been removed: "We specially have to take the energy into consideration with which the

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<sup>34</sup> Chapter VIII explains that the proportions on the colour sphere are context dependent.

light effects the eye. The picture of the sun stays longest."<sup>35</sup> Schopenhauer's explanation is less simple but he might well agree with Goethe's statement that the picture on the retina "is not the end to its effect. It doesn't just work as a picture, but also as energy beyond itself."<sup>36</sup>

This implies that the energy has an effect on us *without us representing* it any longer and hence without us treating it as an object, even if it is possible to concentrate on it and thus make its visible appearance into an object suitable for our understanding. While Goethe's energy strives towards higher goals Schopenhauer's Will is blind and as such unalterable. Both, however, are completely independent from us and yet affect us. Despite Schopenhauer claiming that objective Platonic contemplation is only possible because colour does not affect the Will (WWVII, §3, p.40), there are several cases in favour of colours as forces of the Will (and hence affecting our will): the immediate effect that colour can have on our moods, beginning with the as such inexplicable difference between warm and cold colours down to "aggressive" or "soothing" colours; but also personal reactions which are not unlike those experienced when confronted with music (which in Schopenhauer's philosophy is a direct objectivation of the Will): Thus a room painted too bright in white and pink might "hurt the eye" similarly to very high sounds on a flute which "hurt the ear". On the other hand a sonorous bass sound could be similar to a dark greenish-blue room or perhaps to one of Gotthart Graubner's "colour-space-bodies". Details of these parallels have also been used in synaesthetic works of art.<sup>37</sup>

It is hard to explain the effects colours can have on us without becoming anthropomorphic about them: i.e. without making them into active subjects and us into passive objects. By monitoring ourselves we can learn to classify the effects colours have on us in different situations (in a summer forest, while driving at night, during migraines etc.), but we cannot get to the core of the colours themselves this way. It is in

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<sup>35</sup> "Besonders auch kommt die Energie in Betracht, womit eine Lichtwirkung das Auge trifft. Am längsten bleibt das Bild der Sonne..." (Fl.24)

<sup>36</sup> "...aber damit ist die Wirkung noch nicht vollendet. Es wirkt nicht allein als Bild, sondern auch als Energie über sich hinaus." (Fl.90)

<sup>37</sup> Abraham (1983) gives also neurophysiological and semantic evidence for Goethe's synaesthetic polarities as given in the Farbenlehre §696. See also chapter X.

this sense that we treat colours like human beings (subjects) dividing them into nasty and friendly colours, weak and powerful ones, etc. That each colour may have its own particular behaviour was also believed by Rudolf Steiner, the classrooms of whose schools are painted in different colours according to the age groups of the children taught in them.<sup>38</sup> This is done not as a way of representing what the children have in mind, but so that the individual energies of each colour will meet those children who are most likely to use these energies rather than be distracted or even disturbed by them.

## 5.2. Colour, Will and Music

While it is tempting to discard the treatment of colours as active subjects independent of human beings as esoteric nonsense, this becomes difficult if one believes that there is some kind of energy or Will or whatever out there which exists independently of human beings at all. For how else would this something make itself noticeable to us but through immediate (i.e. non-representational) effects on us? Schopenhauer treats music as such an effect. That music should be able to convey the whole Will may seem more likely than that colour should be able to do the same, especially as music exists in time. But a closer look at the parallels between music and colour may lead to closer connections than are apparent at first sight (see chapter X, sect.3).

For now let me conclude that painting, and especially abstract painting is easier to explain if we treat colours as subjects in themselves, some of whose qualities can be understood (represented) by humans, others however remain a mystery. Whether this is so because there are Platonic Ideas of colour which I myself have not (yet) grasped, or whether colours exist in themselves and are as such not graspable at all, is by the nature of this option impossible for me to decide.

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<sup>38</sup> A member of the Edinburgh Rudolf Steiner School told me that individual schools differ slightly in their choice of colours, but they would all, for instance, use peach colour for their most "spiritual" room (usually a meeting room for special occasions, which hence should be suitable for all age groups).

I will say, however, that metaphysical colours, be they Platonic Ideas, expressions of Will, or any other entity, are useful for any dualist system of philosophy as their existence explains colour harmony and disharmony. They can thus be taken as good arguments for systems which like Schopenhauer's distinguish between rational representation and Will; but they may also be useful to someone who believes in a God: For aren't colour and light the most common signs of or metaphors for the presence of God?<sup>39</sup>

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<sup>39</sup> It obviously depends on one's religious beliefs whether one wants to treat these colour or light appearances as metaphors or as true revelations.

## VI LIGHT

Since colour is both physically and phenomenologically closely related to light it seems only fair that I should begin my closer investigation into the nature of colour with a chapter on light. Goethe, as we have seen, calls colours the deeds and sufferings of light. But he clearly rejects investigations into the nature of light itself:

"For really we are trying in vain to express the nature [Wesen] of a thing. It is its effects that we perceive, and a complete history of these effects might well enclose the nature [Wesen] of the thing. In vain do we try to describe the character of a man; but compile his acts, his deeds, and a picture of his character will appear. The colours are the deeds of light, deeds and sufferings. In this sense we can expect them to give us clues about light."<sup>1</sup>

I believe that Wittgenstein may have held a similar view regarding the nature of light. In *Remarks on Colour* he does not mention light except when it is seen as reflection or sheen on an object. So like Goethe, Wittgenstein remains in the realm of concrete examples of manifestations of light (what I shall call "light-pictures"). Both seem to imply that light itself must be an active force but one that is only intelligible through its effects, namely colours. Schopenhauer explains the nature of colour by the nature of our colour vision; accordingly the existence and nature of light external to and independent from us can only be known by speculation, a method he too rejects.<sup>2</sup>

What these three philosophers are rejecting to is an investigation into what I shall call "light-in-itself". They do not think that there is no light, or that the concept of light is non-sensical, but merely that we cannot go very far in our investigation of the nature of light itself. Hegel and Schelling on the other hand, use light as a fundamental

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<sup>1</sup> "Denn eigentlich unternehmen wir umsonst, das Wesen eines Dinges auszudrücken. Wirkungen werden wir gewahr, und eine vollständige Geschichte dieser Wirkungen umfasste wohl allenfalls das Wesen jenes Dinges. Vegebens bemühen wir uns, den Charakter eines Menschen zu schildern; man stelle dagegen seine Handlungen, seine Taten zusammen, und ein Bild des Charakters wird uns entgegentreten. Die Farben sind Taten des Lichts, Taten und Leiden. In diesem Sinne können wir von denselben Aufschlüsse über das Licht erwarten." (Farbenlehre, Preface, p.315)

<sup>2</sup> "Admittedly the nature of light is a secret to us: but it is better to admit this than to stand in the way of future insights by proposing bad theories." - "Allerdings ist die Natur des Lichtes uns ein Geheimnis: aber es ist besser, dies einzugestehen, als durch schlechte Theorien der künftigen Erkenntnis den Weg zu verrennen." (WWVII, §24, p.408)

concept in their natural philosophy. In this chapter I shall therefore begin with the notion of light as Hegel understands it before I analyse more concrete occurrences of light.

I wish to distinguish four kinds of light:

1. Light-in-itself: an absolute, ideal and positive force, itself invisible.
2. Real but itself invisible light:
  - a) Light source: light as causing visible effects; with the exception of light pictures (see below) light sources too are invisible, but their activity can be known empirically.
  - b) Illumination: the passive prerequisite for vision; itself invisible except as light pictures.
3. Light picture: I shall call all visible light light pictures because of the edge which, like a picture frame, separates them from darker areas; all light pictures are coloured.
4. Painted light: since the first two kinds of light are invisible they cannot be reproduced, neither in painting nor in film or photography. Light pictures, however, can be reproduced, and I shall return to painted light in chapter X.

In this chapter I shall only discuss light-in-itself, light sources, illumination, and my notion of the light picture.

## 1. Light-in-Itself

The concept of light-in-itself is not easy to grasp and one might ask whether it is meaningful at all. As an ideal and absolute invisible force it is a metaphysical construct rather than a concept capturing reality, and Goethe's and Wittgenstein's rejection of a discussion such as the one that follows in this section, has my sympathies. Nevertheless I want to enter the forbidden zone of metaphysics and make as good a case as I can for Hegel's notion of light - for that, as the title of this section suggests, is what it is about.

I can see two good reasons for wanting to understand the nature of light-in-itself. First, we seem to feel that there is more to light than the visible section of some invisible waves. There is something miraculous and powerful in the way in which one can use a torch to light up whatever section of a garden or a room one wants; for as the light beam makes only some parts of our surroundings visible it seems to bring them into existence. Accordingly, there is also a sense of failure when the light does not reach far enough into the trees or cannot light up the sky. This power of light is distinctly different from the physical explanation we read about in an encyclopaedia.

Secondly, and this follows from the first point, light is one of the strongest, if not *the* strongest, metaphor in the history of mankind. Most religions use light metaphors for their gods or even make the sun itself their main god, and in Western philosophy Plato's analogy of the sun in the *Republic* together with Christian ideas led to the light metaphysics of the Middle Ages<sup>3</sup>. We have the feeling that there must be a reason for this metaphor, something intrinsic to the nature of light which makes it more suitable as a metaphor for the highest unknown or "God" than anything else in our everyday surroundings. As Schopenhauer says:

"Light is the most delightful of all things: it has become the symbol of everything good and redeeming... All this derives alone from the fact that light is the correlate and condition of the most perfect contemplation, the only one [kind of contemplation] that absolutely does not affect the Will."<sup>4</sup>

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<sup>3</sup> It therefore seems strange that the Middle Ages are often referred to as the "dark age" when few periods in European history were ever as fascinated by light as the Middle Ages were. It was the time of colourful manuscripts and Gothic cathedrals with stained glass windows.

<sup>4</sup> "Das Licht ist das Erfreulichste der Dinge: es ist das Symbol alles Guten und Heilbringenden geworden.... Dies alles kommt allein daher, daß das Licht das Korrelat und die Bedingung der vollkommensten anschaulichen Erkenntnisweise ist, der einzigen, die unmittelbar durchaus nicht den Willen affiziert." (WWVVI, §38, p.284)

Before we enter the depths of Hegel's writings on light let me just list what we know about light:

1. its effects: shining surfaces, reflections, illumination, also colour effects such as rainbows etc.
2. that light is light in the sense of "without weight"<sup>5</sup>
3. that light seems to be immaterial and pure (hence its metaphorical value) in the sense that anything in its way darkens it and makes it less pure.

As we shall see Hegel's notion of light as he expounds it in his *Encyclopaedia* makes these three intuitions part of the concept of light-in-itself.<sup>6</sup> Hegel treats light under two aspects: In the *Encyclopaedia* he treats light as a free physical body, while in his *Lectures in Aesthetics* he discusses both the possibility of painting light and the magical effect that this produces. Fortunately the concepts of the two are closely enough interlinked for me to use both texts interchangeably, though in this section I shall concentrate on the *Encyclopaedia* since most of the *Aesthetics* will be treated in my section on painting.

Although this may seem tedious, a short overview of the structure of Hegel's philosophy of nature is necessary to establish Hegel's concept of light: According to Hegel the "idea as nature" occurs in three determinations (Bestimmungen): as

- externality (Aussereinander),
- individuality (Besonderheit),
- and subjectivity (Subjektivität).

*Externality* is studied by mechanics which examines matter and its system, a system that must be ideal since its parts are as themselves (an sich) and determined towards infinite particularisation, i.e. they have no inner form or structure so that their structure has to be ideally imposed onto them.

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<sup>5</sup> Etymologically the two are not related. The bright light shares its Indoeuropean root "leuk-" with Licht, leukos, lux, lumen etc.. while the lightweighted "light" together with leicht, leits, lätt, levis, levare, etc. comes from le[n]g h - light in movement and weight, hence German "gelingen" - to succeed.

<sup>6</sup> The term light-in-itself is not used by Hegel. Yet I find it useful in order to distinguish Hegel's understanding of light from other uses of the same word.

*Individuality* is studied by physics;<sup>7</sup> it is reality set in difference, in a relation of reflection whose in-itself (in sich) is natural individuality (this will be further explained).

The study of *subjectivity* is organics, the study of living nature in which the real difference between forms through their different individualities is brought back to unity and finds itself and is for-itself in subjectivity.

The study of *light* is part of physics which again consists of three parts:

- the study of general individuality - part of which is the study of light;
- individual individuality - the study of weight and its oppositions;
- and at last the "Aufhebung" of the polarity between the first two parts:  
total, free individuality - part of which is the study of colour.

*General Individuality* is again divided into three aspects: free physical bodies, the elements, and elemental processes (meteorology). *Light* is the first of the free physical bodies and the study of light therefore forms the beginning of Hegel's "Physics of General Individuality" ("Physik der allgemeinen Individualität"). In order to understand Hegel's treatment of light in his philosophy of nature I shall quote the whole of paragraph 275 and then explain it in detail with the help of the paragraphs following it:

"The primary qualified matter it is as its pure identity with itself, as unity of reflection-in-itself, thus as primary, still itself abstract manifestation. Existing in nature it is the relation to itself as independent from the other determinations of totality. This existing general Self of matter is light, - as individuality the star, and the same as a moment of totality the sun."<sup>8</sup>

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<sup>7</sup> Please note that mechanics is not a subject for physics as it is today: For Hegel, mechanics essentially comprises time, space, matter and movement in abstracto, while physics deals with physical properties of objects and matter on earth.

<sup>8</sup> "Die erste qualifizierte Materie ist sie als ihre reine Identität mit sich, als Einheit der Reflexion-in-sich, somit die erste, selbst noch abstrakte Manifestation. In der Natur daseiend ist sie die Beziehung auf sich als selbstständig gegen die andern Bestimmungen der Totalität. Dies existierende allgemeine Selbst der Materie ist das Licht, - als Individualität der Stern, und derselbe als Moment einer Totalität die Sonne." (Enc.§275)

### 1.1. "Light is primary qualified matter"

For Hegel, the whole of natural philosophy deals with ideas in the form of being-other (Anderssein), so that the idea in nature appears as its own negative and is thus external to itself. Externality (Äusserlichkeit) is the determination of the idea as nature (§247).

Matter as treated in mechanics is infinite individuality which can be systematised in categories of time and space (wholly abstract externality), matter and movement (individual externality) and free movement (matter in the freedom of its in-itself-existing concept). It is the study of the last of these, absolute mechanics, that leads to the study of light: In free movement the externality of matter is no longer external to matter, and matter becomes one with its form: as *qualified matter* it can move its own form or, in Hegel's words, in qualified matter the abstract, dumb Being-in-itself (weight) is "resolved to form" ("zur Form entschlossen", §271). Thus it has being-for-itself within itself rather than external to itself (as non-qualified matter does, which is merely shaped through gravity); qualified matter manifests itself and determines spatiality through the form immanent in itself in opposition to gravity.<sup>9</sup>

From light as qualified matter we should thus expect the following two qualities: that it has form immanent to itself, and that it can determine the spatial (form) out of itself and in opposition to (independently from) gravity. Light fulfils these two criteria: it fills space independently from gravity<sup>10</sup> and as heavenly body has form immanent to itself.<sup>11</sup>

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<sup>9</sup> "Die Materie entreisst auf diese Weise sich der Schwere, manifestiert sich, sich an ihr selbst bestimmend, und bestimmt durch die ihr immanente Form das Räumliche aus sich der Schwere gegenüber,.." (Enc.§272)

<sup>10</sup> We must forgive Hegel for not anticipating Einstein's discovery that light is in fact bent by gravity - ideally the concept of light seems to include (rightly or wrongly) freedom from the forces of gravity, so that in this sense the concept of light is in opposition to the concept of gravity.

<sup>11</sup> B.Falkenburg interprets this passage to mean that "light is conceived of as a *luminous matter* [her emphasis], which on account of this specific quality is not related to any point outside the space it occupies." (p.338).

Although Falkenburg is correct with regard to the sun that "light is identified with luminous matter" (p.339), I believe that Hegel does not identify light itself with luminous matter. Not only is there no textual evidence for this interpretation, but the concept of "luminous matter" cannot possibly be identical to the concept of "light" since "light" would then consist of matter *plus* luminosity (ie.light), and this goes against Hegel's notion of light as identity with itself.

Cp. also Aristotle: "... light is neither fire nor any kind whatsoever of body nor an efflux from any kind of body (if it were it would again itself be a kind of body) - it is the presence of fire or of something resembling fire in what is transparent. It is certainly not a body, for two bodies cannot be present in the same place." (*De Anima*, ch.7)

### 1.2. "Light is matter as its pure identity with itself"

This point is further explained in the following paragraph (§276): light is the "abstract Self of matter" ("das abstrakte Selbst der Materie") because it is independent from gravity: it is "the absolutely-light" ("das Absolut-Leichte"). Phrases like "abstract self", "pure identity" and even "abstract-identical ideality" (§279) are used throughout Hegel's texts (both the philosophy of nature and the lectures on aesthetics) and justly emphasised to point out the purity of light. For nothing could be purer than something that is not influenced or part of anything other than itself.

Hegel's reasons for defending the purity of light are also a sign of support for Goethe's stance against Newton. For Hegel, like Goethe and mentioning Goethe, vigorously argues against any splitting up of light into particles, waves, light beams, bundles of light beams or waves, and other "Newtonian nonsense". Light *as ideality* cannot possibly be divided into parts, and as *absolutely*-light (non-weighted) can even less be split into parts which may have mass (no matter how little).

Personally, I find the insistence on light as indivisible convincing: When we think of light itself rather than of light beams (such as search lights), we do conceive of light as ultimately simple, pure and indivisible. For when we try to divide light, for instance by putting up a divide perpendicular to the light source, the light itself, though "halved", does not lose any of its identity but seems to retain all the properties it had before. Also, notwithstanding Einstein I think that Hegel is right in defining light as absolutely weightless - we can hardly think of anything lighter than light.

### 1.3. "Light is matter as unity of the reflection-in-itself"

I believe that this definition is the key to understanding the concept of light as it is in itself. While the previous points set light in opposition to its *empirical* counterpoint gravity, we now set it against its *conceptual* opposite: darkness. The main argument is set out in paragraphs 277 and 278. Darkness is the negative of light in the same sense in which a photo negative is a "negative": light and dark are of equal importance but diametrically opposed. They are also the two ends on a line of relative lightness.

Because light relates to other forms of qualified matter primarily as other, that is, as something external to them, all other conceptual moments of qualified matter are its negative, i.e. dark. In as far as darkness also exists independently from light, light can meet it at its surface but cannot penetrate darkness itself. Hegel calls darkness the "for now opaque" ("zunächst Undurchsichtigen"), because anything that we only know the surface of appears to be opaque.

Light thus simultaneously *manifests* this surface and itself on the surface so that the two appear through each other. In Hegel's words: "As each appears on the other and thus only the other on it, this manifestation is through its setting-of-itself-as-external ("Außersichsetzen") the abstract-infinite reflection-in-itself, through which nothing yet appears on itself for itself."<sup>12</sup>

That light is the *unity of this reflection-in-itself* while darkness remains unknown can be explained by the spatial relation between the two: When light meets absolute darkness, as perceivers we are always on the light side and remain "in the dark" about whatever lies on the dark side. Also, Hegel correctly observes that light travels in a straight line.<sup>13</sup> Its law is therefore one of sameness and unity: the angle at which light meets a smooth surface will always be the same as the angle reflected. This means that light has the unity of reflection-in-itself. Goethe too writes: "We can imagine the shining of the sun or any light as an infinite mirror-reflection of a limited light picture."<sup>14</sup>

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<sup>12</sup> "So jedes an Andern erscheinend, und damit nur Anderes an ihm erscheinend, ist dies Manifestieren durch sein Aussersichsetzen die abstrakt-unendliche Reflexion-in-sich, durch welche noch nichts an ihm selbst für sich zur Erscheinung kommt." (Enc.§277)

<sup>13</sup> Goethe too discovered the importance of light travelling in a straight line. Yet unlike Hegel he sees how light can "bend" around an object if it shines along its edge. Schopenhauer takes the fact that light shines in a straight line as the reason why our understanding (Verstand) can so easily interpret the effects on our eyes as causes in the external world (WWV II, §3, p.37).

<sup>14</sup> Goethe further derives the generally round shape of lights from this fact, which only makes sense if light is not reflected in a perfectly straight line but spreads out: "Wir können uns vielmehr das Scheinen der Sonne oder irgendeines Lichtes als eine unendliche Abspiegelung des beschränkten Lichtbildes vorstellen, woraus sich denn wohl ableiten lässt, wie alle viereckigen Öffnungen, durch welche die Sonne scheint, in gewissen Entfernungen, je nachdem sie grösser oder kleiner sind, ein rundes Bild geben müssen." (Fl.402)

This also means that a perfectly smooth surface does not affect the quality but only the direction of light. We find this to be true in cases where we mistakenly take a strong reflection of light to be a light source itself.<sup>15</sup>

The law of reflection shows that light as truly primary qualified matter is not affected *spatially* by its negative. It also means that light-in-itself just as darkness-in-itself remains unknowable: if we have a strong light shining directly into a mirror so that the light is reflected back to its source there is no way of telling one from the other. So we could not identify light-in-itself or probe further than the surface of the mirror - the meeting point of light and dark.

From what I wrote so far I conclude that

1. Light travels in a straight line. Otherwise, clear mirror images would be impossible (see also next chapter).
2. The conceptual opposite of light is dark (see also next chapter).
3. Without further information we can say nothing about the nature of darkness except that it is the other of light; if I want to assume an independent existence for darkness I should assume it to be opaque for I can only see its surface. We only ever see the surface of something dark, because while it is dark we cannot judge the spatial extension of the dark object or space; in complete darkness we cannot, for instance, tell the difference between a large basement, a small cupboard or a cloth around our eyes (by vision alone).
4. But this surface is not darkness itself - it only shows that there is something other in the path of light; and by definition (see point 2) anything other than light is dark. That this surface is not darkness itself can also be inferred from the fact that we do not *see* darkness in the strict sense, but are instead hindered from seeing.

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<sup>15</sup> "when subjective, pure reflection continues the Lehre of the weak and decreasing lights, and when made objective [i.e. using sunlight under a free sky] points to something real external to human beings, even in the slightest of appearances."

"reine Spiegelung, die sich, sofern sie subjektiv ist, an die Lehre von den schwach wirkenden und abklingenden Lichtern anschliesst und, insofern sie objektiv gemacht werden kann, auf ein ausser dem Menschen Reales, sogar in den leisesten Erscheinungen hindeutet." (Fl.370, my translation)

#### 1.4. "Light is the primary, itself still abstract manifestation"

To make sense of this phrase we must limit it to refer only to visual manifestations, for I do not think that Hegel could reasonably call light the primary manifestation as such. We have just seen that light appears only on something other than itself, that it makes the other manifest, and that it makes any other manifest. That light is indifferent to the objects it makes manifest is also emphasised in Hegel's *Lectures on Aesthetics*: In his comment to §276 Hegel writes: "When the idea (Vorstellung) which has been called realist denies that ideality was existent in nature then among others it should also be referred to light, this pure manifestation which is nothing but manifestation."<sup>16</sup>

Light is a true Hegelian synthesis of the real and the ideal: ideally and as being-in-itself light is invisible, but it becomes visible when it manifests itself on something other than itself. As the power of manifestation it thus simultaneously manifests the ideal and the real. It is again in the *Aesthetics* that this point becomes more clear as Hegel calls light the "Making-Visible as such" (Sichtbarmachen als solches).

Light is *primary manifestation* because it does not derive from anything other than itself, and also because it is nothing other than manifestation: We would not know light if it did not manifest the visible world, and we do not know anything else about it other than that it manifests the visible world (and nor should we try to probe further, in the way Newton and other physicists do, for that is to leave the realm of pure manifestation and hence the realm of light-in-itself).

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<sup>16</sup> "Wenn die Vorstellung, welche man realistisch genannt hat, leugnet, dass in der Natur die Idealität vorhanden sei, so ist sie unter anderem auch an das Licht, an dieses reine Manifestieren, welches nichts als Manifestieren ist, zu verweisen." (Enc. §276)

1.5. "Existing in nature light is the relation to itself as independent from all other determinations of totality. This existing general Self of matter is light, - as individuality the star, and the same as a moment of a totality the sun."

I treat the rest of §275 as one because it more or less follows from what I have said so far. Hegel moves from the abstract reason for light being primary qualified matter to its empirical manifestation in the form of planets and stars. As is the case for all naturally occurring forms, light too must externalise itself, i.e. represent itself in some perceptible way; otherwise it could not be studied by physics but would remain a pure idea, to be studied by logic rather than by an empirical science. Yet it must keep the qualities ideally assigned to it.

I have already transferred Hegel's ideal concept to natural occurrences of light, but let me quickly go through it again: Light in nature must be a relation to itself as independent from other determinations - this is the independence of light from gravity and spatial division as well as the quality to shine in a straight path, which makes light indifferent to everything other than what is in its way (light is thus independent from gravity, wind, but also from subjectivity as treated in Hegel's chapter on organics).

Somehow more puzzling are the references to the stars and the sun. The explanatory context can be found in §274: Hegel divides the "Physics of General Individuality" into three kinds of physical qualities: those that are immediate and external in an independent way as the physically determined heavenly bodies, and two others which I shall come back to later. Light occurs in all three qualities but manifests itself *immediately* only in "solidified lights": The stars which are relatively small (from our perspective) and which exist purely as other to the dark night surrounding them form the first group. They fulfil the criterion of independence in that they seem not to depend on anything other than themselves for their existence. They are nothing but lights in the dark,<sup>17</sup> and as such they manifest both the night and themselves: we cannot see the stars unless it is dark and we would not notice the dark if everything was star, i.e. light. Everything as light is, however, the second case: the sun is the totality of

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<sup>17</sup> Strictly speaking, most stars are of course only seen because they reflect light not because they produce light themselves. Nevertheless they appear as independent luminous bodies.

primary qualified matter because it is light without surrounding light (that is why we cannot see the sun on bright (= totally light) days). Yet the sun too only manifests itself on other objects (most of them earthly) and as lightsource manifests these earthly things.

### 1.6. Resulting Oppositions to Light-in-Itself

#### a) Rigidity and Neutrality

As we have seen, darkness, as the negative of light, is the opposition to its abstract-identical ideality - is opposition-in-itself (§279). In material reality this opposition appears in two forms: as bodily difference, ie. in material being-for-itself or "rigidity"; and as oppositioning as such, which is not held by individuality but merely as something collapsed into itself: dissolving "neutrality".

As with light existing in the sun and the stars, darkness too exists in the sky: its rigid body is the moon which does not move around itself like a true individual but serves the earth. As it is always the same to the earth (we only ever see the same side of the moon) it is to us rigid.

The neutral body is the comet which has no core but dissolves into an everchanging fiery tail. The opposition comes back to itself in a third kind of body, the body of individuality (§280). All planets are bodies of individual totality, including planet earth. The earth is a body of *individual totality*, as opposed to the sun which as a form of *general self* of totality, and opposed to the stars which are *general moments* of individuality. Hegel's classification derives from the earth moving both around the sun (the general self of totality) and around itself, so that it also has its own central point of unity ("Einheitspunkt").

## b) Physical Elements

The body of individuality (planet earth) encompasses as subordinated moments on it the determinations of elemental totality: bodies which exist free-for-themselves, or "physical elements".<sup>18</sup> Each of the elements is different from light in a different aspect, so that we arrive at several new polarities in addition to the ones already established (light/dark and light/heavy). Even if the following four paragraphs may seem excentric or irrelevant, please bear with me (and with Hegel), as they do in the end reveal further insights into the nature of light.

### 1. Air (§282)

While light is positive identity with itself or self-manifestation, air is merely *negative generality*, is a *selfless* moment of something other, and hence has mass. Light and air are both cases of indifferentiated simplicity, but air is passive against the light since light can travel through it. Air is thus transparent and elastic in a mechanical way.

### 2. Fire (§283)

Air is, according to Hegel, as itself (an sich) fire, and fire is air set as *negative generality*. Fire is also materialised time, is restless, and consumes the other as well as itself and thus becomes *neutrality*. Fire like the moon is a being *for-itself*, but unlike the moon is not indifferently rigid but an unrestfulness for-itself set in individuality.

### 3. Water (§284)

Water is the *truly neutral*, the collapsed opposition without any individuality for-itself, without rigidity or determination in-itself, a general balance which dissolves all determinations and shapes (takes on any shape).

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<sup>18</sup> "Der Körper der Individualität hat die Bestimmungen der elementarischen Totalität, welche unmittelbar als frei für sich bestehende Körper sind, als unterworfenen Momente an ihm; so machen sie seine allgemeinen physikalischen Elemente aus." (§281)

#### 4. Earthliness<sup>19</sup> (§285)

Undetermined earthliness is different from the other elements in that it is an individual element with developed difference (it can take on shapes) and an *individual determination* of this *difference*. As *totality* it keeps the other elements together and is the power which begins their processes and keeps them going. Thus we arrive at the elemental process - meteorology.<sup>20</sup>

The reason why I mention all these rather archaic and possibly more anecdotal than philosophical points is that they are all part of the general individuality of which light is the primary moment. So, within one group of physical phenomena they all form polarities with light.

Let me just repeat these polarities:

*Light as abstract identical ideality is opposed by*

1. dark - the abstract negative of light;
2. weight - which has its identity outside itself;
3. rigidity - being-for-itself defined as mere difference from  
(hence serving rather than being individuality);
4. neutrality - opposition as such without own individuality and  
hence collapsed into dissolution;
5. earth - individual totality come back to itself;
6. air - negative generality;
7. fire - being for-itself, negativity related to itself;
8. water - neutrality without any determination whatsoever;
9. earthliness - developed difference and its individual determination.

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<sup>19</sup> Please note that in German the two words "soil" and "earth" are both "Erde". Thus Hegel's element "Erdigkeit" is being-soil as well as being-earth.

<sup>20</sup> Hegel believes that all processes of the earth are continued through the primary relation between its general self, light, and the particular position of the earth to the sun. No doubt Hegel can thus explain the seasons but I shall not go into any more details.

We can group these into active and passive oppositions: Darkness, weight, and rigidity are active, air and fire as well as the two neutral forms of comets and water are passive. The earth and earthliness at last are special cases of individuality.

Hegel's classification now makes sense: Darkness, mass and rigid bodies can indeed actively stand in the way of light: darkness seems to overcome light at night time, weighted material always disturbs the light somehow (any weighted, i.e. material medium whatsoever disperses, reflects or swallows light), and rigid bodies do the same, most notably the moon during an eclipse of the sun. The passive elements on the other hand, air and fire, water<sup>21</sup> and comets not only let light through but may even become the medium of light.

Hegel's notion of earth is less easy to understand until we realise that for him all physical processes take place on earth<sup>22</sup> and that the earth is therefore the kind of place that allows these processes to happen. All earthly elements have some relation to light.<sup>23</sup> Colours are the lights of the earth, which result from a special relationship of earthliness with light (see below).

### 1.7. Conclusion: Light-in-Itself

Hegel makes a good case for an ideal synthesis of ideal and real in the form of light. I believe that an understanding of light such as Hegel's is an ideal beginning (in its double sense) for the understanding of the metaphorical value of light. Like Beauty, Goodness, Truth and God, light is eternal yet not everywhere, is indifferent to where it occurs, pervades some aspects of life but is hindered by others, and is pure identity with itself: While most concepts can be defined with reference to Truth, Goodness, God or Beauty it will be hard to define any of these in terms of something else. Similarly it is easier to define colour, visibility, eyesight and various other concepts with reference to light than the other way round. This does not, of course, mean that I am justified in

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<sup>21</sup> Hegel seems to be inconsistent when it comes to the nature of water which is of course a weighted substance. He is probably thinking of ideal water as being perfectly transparent, so that it would be the impurities in water that make it behave like other forms of matter.

<sup>22</sup> Hegel uses the notion "physics" almost in the old Greek sense of "nature", presumably meaning all natural processes on earth.

proposing the ontological existence of absolute and ideal beings such as Truth, Beauty, Goodness, God, or Light-in-Itself. But at least I hope to have shown that Light is one of these concepts, of which either all exist objectively or none of them does.<sup>24</sup>

### 1.8. Postscriptum: Light and Colour

So how are our visible and concrete colours, such as the redness of pillarboxes related to the abstractum which I call "light-in-itself"? According to Hegel, colour is the synthesis of light and dark/matter. He therefore devotes the chapter after light as "general individuality" to darkness as "particular individuality" (Enc. §§290-307). Colour is their synthesis as "total individuality": Individual physical objects ("Körper") which qua physical objects partake of materiality (i.e. mass and darkness) can be distinguished from each other by their properties. One of their distinguishing features is their relation to light. According to Hegel there are three ways in which a material substance can interact with light: it can completely transmit light (as in ideally transparent crystals; §317); it can refract light (as in water, causing spatial illusions (§318), and in other transparent bodies, causing entoptic colours (§319)); and it can retain light within substance in the form of colour (§320).

This latter case is the for-itself (Fürsichsein) of form gaining being-there ("Dasein"). In other words, colour is the materialisation of light in physical bodies, i.e. it shows the light's "being there" (Dasein) in the physical body for itself, i.e. independently from other causes. Colour is thus the "concrete and individualised unity"

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<sup>23</sup> which are taken up again in a later section (Enc. §§317ff.)

<sup>24</sup> Schelling's notion of light is similar to Hegel's:

"Light is the ideal as it shines into nature, the first breakthrough of idealism. The *idea itself* is light, but *absolute* light. In appearing light [the idea] appears as something ideal, as light; but only as *relative* light, relatively-ideal. It [the idea] casts off its covers with which it clothes itself in *matter*; but in order to *appear* as something ideal, it has to appear in opposition to the real."

"Das Licht ist das in die Natur scheinende Ideale, der erste Durchbruch des Idealismus. Die *Idee selbst* ist das *Licht*, aber *absolutes* Licht. In dem erscheinenden Licht erscheint sie als Ideales, als Licht; aber nur als *relatives* Licht, relativ-Ideales. Sie legt die Hülle ab, mit der sie sich in der *Materie* bekleidet; aber, um eben als Ideales zu *erscheinen*, muß sie im Gegensatz gegen das Reale erscheinen." (*Philosophie der Kunst*, I/5, 507)

Please note that Stott translates the first sentence as "Light is the element of the ideal that is manifested in nature" (p.120), whereas my translation suggests that the ideal as a whole appears in nature, albeit in natural (i.e. imperfect) form. I doubt that the ideal can consist of "elements", but as I said, I am by no means a Schelling scholar and Stott's alternative might be a more suitable translation than mine.

of light and darkness/matter. The resulting qualities of colour as partaking both of ideal light and solid matter can be analysed by synthesising the properties of light with those of the individual elements as listed above (1.6.) to yield

1. degrees of lightness (dark);
2. particular external relations (weight);
3. particular internal relations (rigidity);
4. degrees of transparency (neutrality);
5. colour as encompassing all visible processes (earth);
6. colour as based on a minimum of transparent materiality (air);
7. colour as partaking of time (fire);
8. colours as taking on any shapes (water);
9. chemical colours as determined colour differences (earthliness).<sup>25</sup>

## **2. Empirically Real, yet Invisible Light**

By empirically real light I mean light that can be discovered and measured empirically, be it by light meters or by simpler means such as seeing that it is light outside, or being dazzled by light. I shall argue that although we can discover *that* this light exists we cannot see it. Light in this sense can be divided into light sources and illumination. Both *can* become visible but only as "light pictures", a category which I shall explain in my next section. The reasons why I think that light sources and illumination are usually invisible are the following:

### a) Light Sources

Strong light sources are usually too bright to be seen. They dazzle us and therefore cannot be seen in the same sense in which chairs and other straightforward objects of perception can be seen. For this reason, the word "light source" is useful as it reminds

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<sup>25</sup> Hegel does not make these connections himself and admittedly some of them seem far-fetched; yet I believe that Hegel would have been pleased with them. The mere possibility of combining his polar concepts in such a way as to show the properties of colours, demonstrates how ingeniously interwoven the concepts in Hegel's *Encyclopedia* really are.

us of a somehow hidden source which we only know by its effects. As these effects make us conclude that there is a light source, however, I call light sources empirically real even when they cannot be seen themselves.

#### b) Illumination

Illumination is usually assumed rather than seen. It is a prerequisite for my seeing things that the space in which these things are is well enough illuminated. I might notice a particularly bright or dark room and comment on how well or badly it is lit. In these cases however, the illumination is not so much an object of my perception than a fact (see next paragraph: I do not see the illumination but I see that something is well or badly illuminated). Illumination, like light sources, can become visible as light-pictures, such as spot lights (especially when these are coloured).

#### c) The connection between light source and illumination

There is an obvious causal connection between light source and illumination. When I notice that a room is quite dark I conclude that the light source for its illumination is rather weak. Similarly, when I go out to buy a 100 watts light bulb for my kitchen I assume that the kitchen will be lit more brightly than it was with a 60 watts light bulb.

Please note that we judge the illumination or "quality of light" not by looking at the light source or at the illumination itself but by observing the objects illuminated. Thus we do not see the illumination, but we see *that* the room is well illuminated. Depending on our purposes we may want the same table lit brightly on most days but less brightly for a party. Yet we would be puzzled if someone asked us to check the illumination by looking at it. Illumination is no straightforward object of perception and may indeed not be anything at all but an overall effect of more or less well lit surfaces in a room. The only thing I can perceive regarding illumination is whether *something* in particular is more or less well lit (which relates to Hegel's point of light manifesting itself only on something dark). It follows that I would not be able to judge the illumination in a void (and indeed we might say that the concept of illumination does not apply in a void: for reasons still to come I want to argue that there can only be visibility where there is turbidity).

It makes more sense to speak of looking at a light source than of looking at the illumination (but I would be very careful about looking at a light source in case it might dazzle me). The reason why we feel easier about looking at light sources than at illumination is that light sources are in most cases contained in some kind of physical matter which, when not used as a light source, has all the properties of other physical objects, including that of visibility. Thus I can look at a match, a candle or a torch before I light them, and at light bulbs, at spotlights even and very strong flood lights before they are switched on.

Light sources and illumination are indistinguishable from each other when they are at their strongest and dazzle us.<sup>26</sup> After spending some time in a dark room, for instance, we cannot tell the difference between a very bright day and a light being shone into our face. Another example would be a fluorescent gas or liquid which filled a space with light. A similar effect can be achieved by a great number of light sources in a white room. Thus some modern art galleries seem to be illuminated from within rather than from pointed light sources - we say, "the room is bathed in light". In these cases we judge the illumination to be very strong because we see the objects and walls in the room as very bright objects and walls, not as relatively normal objects and walls with bright lights shining at them.

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<sup>26</sup> "The highest degree of light, such as that of the sun, of phosphorus burning in oxygen, is dazzling and colourless." - "Das höchstenergische Licht, wie das der Sonne, des Phosphors in Lebensluft verbrennend, ist blendend und farblos" (Goethe, Fl.150)

### 3. Light Pictures

I want to argue that even when we think that we see "a light", i.e. when we speak of a light as the object of our visual perception, what we really see is what I call "light pictures". I take this term from Goethe who defined light pictures as anything luminous with an edge.

"For up to now people treated light as a kind of absolute, as a being existing and effective for-itself and, so to say, conditioning itself, which could produce colours out of itself for the slightest reason. To divert the friends of nature from this image and to make them attentive to the fact that in prismatic and other appearances there is no unlimited conditioning, but only limited conditioned light, a light picture - that there are pictures as such, dark ones and light ones: this is the task to solve, the aim to reach."<sup>27</sup>

The edge or limit of the light picture is extremely important and it is useful to think of the light picture as a framed picture. Regarding the nature of light pictures I shall argue for two things:

1. that it is only framed light pictures which we refer to when we say that we see a light;
2. that in light pictures too, light source and illumination can merge.

#### 1. a) Light Source seen as light picture

When travellers in the night see "a light" they see a white or yellow glow framed by blackness. In the twentieth century we see traffic and neon-lights, which also have clearly marked shapes and hence boundaries. We see the sun only when it rises or sets and on misty days, and then we see it as a brightly coloured circle with a more or less clear edge. We see the clearly defined glowing wire in a weak light bulb, but find it hard to distinguish light source from illumination in a strong light bulb (we usually consider the glass of the light bulb as the limit of the light source). There are also natural phenomena where the light source seen is a light picture - good examples are Northern lights and flashes in a thunder storm.

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<sup>27</sup> "Denn man hat bisher das Licht als eine Art von Abstraktum, als ein für sich bestehendes und wirkendes, gewissermassen sich selbst bedingendes, bei geringen Anlässen aus sich selbst die Farben hervorbringendes Wesen gesehen. Von dieser Vorstellungsart jedoch die Naturfreunde abzulenken, sie aufmerksam zu machen, dass bei prismatischen und anderen Erscheinungen nicht von einem unbegrenzten bedingenden, sondern von einem begrenzten bedingten Lichte, von einem Lichtbilde, ja von Bildern überhaupt, hellen oder dunklen, die Rede sei: dies ist die Aufgabe, welche zu lösen, das Ziel, welches zu erreichen wäre." (Fl.361)  
Other references in the *Farbenlehre* to light as limited pictures are at 306, 307, 309, 363, 364, 371, 374, 389, 392, 690, 691.

So, either light dazzles us or it is visible as a light picture in a more or less clear contrast to the relative darkness surrounding it.

#### 1b) Illumination seen as light picture

The best examples for seen illumination are spot lights. The illumination of public buildings too is visible, but when the illumination exactly matches the outline of the building it is impossible to judge whether it is the colour of the building we see or whether it is coloured illumination on a differently coloured surface. (A white building lit by a greenish light will appear to be a greenish building unless some part of the building is not thus lit and so shows its true colour.) Floodlights too show clearly defined lit up areas, as do streetlamps, car lights, torches and other light sources.

So, either illumination is unnoticeable and defined by inference from lit up surfaces, or it too has clearly defined edges and thus becomes a light picture.

#### 2) Merging of light source and illumination

As can be seen from the above cases it is not always clear where the light source ends and the illumination begins. The difference between the two seems to lie in our visual perspective rather than in their nature: I look *at* the light source when I face it, but looking *with* the light source I see the illuminated area - not the light source itself. A good example of this difference in perspective is the case of a relatively weak light source such as a torch: I can look at the torch, but when I hold it in front of me to light up the path, I look at the illuminated area (and do not see the bulb of the torch). Someone else watching me on the other hand, might be looking at the light beam and not be able to tell where the light source ends and the illumination begins. Another example of light source and illumination merging is in film or television. The pictures shown on screen are simultaneously light source and depiction of a lit up world.

As a general rule, light pictures can be represented by photographs and paintings whereas illumination and light source themselves cannot be thus represented. This might make you wonder what the difference is between the empirically real but invisible light source or illumination and light-in-itself as defined by Hegel. The answer

is simple: Light sources and illumination are empirically real in that they can be detected and measured by empirical means whereas light-in-itself is transcendental. The relation between light-in-itself and light source is similar to that of universal and particular. The relation between light source and light picture, however, is one of cause and effect. The light source is the underlying and possibly hidden cause of the colours I see in the light picture, whereas the light-in-itself is their conceptual, or logical basis.

#### **4. The Dimensions of Light**

In order to distinguish further between the four kinds of light I shall now have a quick look at their dimensions. By "light dimensions" I mean the spatial and temporal extension of each kind of light.

*Light-in-itself* is non-dimensional and timeless: We can represent the concepts of light and dark in themselves as a line of which light and dark are the ideal end points. In the middle we have perfect transparency or neutrality. All three are invisible because they all form ideal limits to visibility as such.<sup>28</sup>

*Light sources* are ideally also non-dimensional but exist as points in time and space. Perhaps it is easiest to imagine them as the sun, with black holes as its absolute opposites: While the sun and the black holes have several dimensions as physical entities the light or darkness they produce is again absolute, but in this case physically absolute: they are the greatest and lowest amount of light possible.

*Illumination* on the other hand is always three dimensional and part of time. Illumination is most easily imagined as lit air which can creep into anything unless it meets a physical barrier.

*Light pictures* are two-dimensional: Even if we interpret them as three-dimensional objects, we see the sun or the moon in the evening sky as circles, not as spheres. We see spot lights as essentially flat circles which creep over the ground and onto people, and we see light beams as more or less stretched triangular shapes with a circular base.

I shall return to the notion of light pictures in chapter X. With regard to empirical light (light sources or illumination) I have one main argument for saying that light is only visible as light pictures: If we did not see light sources and illumination as two dimensional light pictures it would be a miracle how they could be reproduced so successfully in films, photographs and paintings.

The polarity that results from this section is the following: the brightest light source (the sun) versus the darkest blackness (a black hole) causes the brightest illumination or no illumination at all. Neither extreme can be object of our perception though we are able to perceive *that* they exist. We judge that something is bright or dark only in relation to the visibility of the objects around us. In my terminology we therefore judge light source and illumination by the brightness of the colours in light pictures.

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<sup>28</sup> I explain the notion of neutrality as a limit to visibility in my next chapter.

## VII

### FOUR FORMS OF NEUTRALITY TRANSPARENCY, REFLECTION, OPACITY, AND WHITENESS

"What is capable of taking on colour is what itself is colourless [...]; what itself is colourless includes a) what is transparent and b) what is invisible or scarcely visible, i.e. what is "dark". The latter (b) is the same as what is transparent, when it is potentially, not of course when it is actually transparent; it is the same substance which is now darkness, now light."<sup>1</sup>

Besides transparency and darkness (blackness), reflections, grey and white can also be called things or substances capable of taking on colour. In this sense they are colour neutral ("monochrome"). This chapter analyses our concepts and the phenomenal qualities of these colour neutral properties. Perhaps surprisingly, the chemical and physical substructures which explain physical transparency, opacity, reflection, white, black and grey are neither necessary nor sufficient conditions for us seeing them thus. While I concentrate on transparency and whiteness, as these are the two properties most frequently discussed in philosophy, most of my arguments are directly transferable to the other colour neutral properties.

I have divided this chapter into the following sections:

1. Conceptual Relations
2. Perceptual and Physical Transparency
3. Whiteness and Transparency
4. The Mixing of White
5. Opacity and Reflection, Black and Grey
6. Conclusion: Four Forms of Neutrality

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<sup>1</sup> Aristotle, *De Anima*, ch.7

## 1. Conceptual Relations

Please note that the following relations are based on phenomenological rather than physical evidence. Thus claims like "everything reflective is opaque" do not imply that all reflective *objects* are opaque, for that is clearly not true. Altogether this section is less describing our every day use of the these terms (which is probably less consistent) than prescriptive for my own use of these terms in the sections that follow.

### 1.1. Transparency and Reflection

Conceptually as well as phenomenally, transparency and reflection are mutually exclusive. That nothing can be transparent and reflective at the same time can best be observed when one looks at a shop window: One can actually only look *at* those parts of the window that reflect oneself and the street, and it is only those parts of the window which do not reflect anything that are transparent. Yet the glass itself is made up of the same material throughout. Transparency and reflection are therefore mutually exclusive regarding the object of vision: A subject sees an object through a transparent medium, but it sees itself as object in a reflection.

### 1.2. Transparency and Opacity

Transparency and opacity are also contradictory terms. Yet in contrast to the shop window example we can imagine situations in which we would argue about whether something was transparent or opaque. This is so because there can be degrees of transparency and opacity (such as in the case of fog). From this it follows that there are at least two concepts of transparency: Ideally transparency is the opposite of reflection, empirically however, there is an additional opposition between transparency and opacity which is not absolute but is a matter of degree.

### 1.3. Reflection and Opacity

Everything reflective is opaque but not everything opaque is reflective. Reflective surfaces are opaque because they are not transparent (see 1.1). Opaque surfaces on the other hand can be more or less reflective. One of the most obvious examples of more or less reflective surfaces is the distinction between matt and glossy photographs, or matt and glossy paint, both of which are perfectly opaque.

### 1.4. Reflection and Whiteness

White surfaces can be more or less reflective (matt and glossy whites), and white is the colour most frequently used to represent reflection in painting (and comic strips). The reflection of light from a mirror is not only stronger than that of a white surface, but there is also a qualitative difference between the two: A mirror reflects directionally and hence leaves reflected colours unchanged, while colours reflected by a white surface are weakened considerably by diffuse reflection. Thus, just as transparency is ideal in that it transmits colours unchanged, so a perfectly reflecting surface mirrors all colours unchanged. A white surface, however, weakens the colours reflected just as milky glass weakens the colours seen through it.

### 1.5. Transparency and Whiteness

The famous statement that nothing can be transparent and white is sometimes empirically challenged by examples such as milky glass, thin fog, etc. Yet these examples are not examples of perfect whiteness or transparency: wherever I see something through milky glass or thin fog this part of the supposedly transparent white medium is neither transparent nor white but appears in the more or less weakened colour of the object seen through the medium. As I shall argue below the puzzle about whiteness and transparency can be solved if we treat transparency as a spatial concept,

whiteness however as a surface concept. This is why only those parts of the milk bottle appear white which I cannot see through.

However, transparency and whiteness also share two qualities: they can both take on any colour, and any colour mixed with them becomes lighter and hence makes them darker (for details see section 3).

## 1.6. Opacity and Whiteness

Everything white is opaque but not everything opaque is white. That everything white is opaque follows from there being no transparent white, and that not everything opaque is white is only obvious because there are so many other colours opaque surfaces can have.

Regarding transparency, the most important result from these six paragraphs is that we look *through* transparent media but *at* opaque and white surfaces and *at* ourselves in reflections. Thus the first rule about transparent objects is that they must have a certain thickness. Vincent Hope suggested to me that transparent objects could therefore be defined as objects which may enclose an opaque object so that we can see the enclosed object from all sides. This definition is useful because it works well with the most common of transparent media, air and water. Because we usually do not walk around the transparent medium, however, and in the common case of window panes and spectacles only ever look through the glass in two directions, I shall give a linear account of transparency to illustrate the relations given above.

Because we cannot see things that directly touch our eyes there is always something between us and the object we are looking at. We can draw a straight line from us to the object we are looking at and call anything that is between us and that object more or less transparent. This linear account gives a good image of what the difference between a transparent, a reflective, and an opaque object is: A transparent object such as a perfectly clear pane of glass lets my looks right through to the object (or the object right through to me, depending on how you like your story to be told).

The opaque object hinders any communication between me and the object I want to see. The reflective object, however, does more than that: it reflects my own image back to me (and the object's image back to the object), so that now I become the object of my own vision. So, while both the reflective and the opaque medium eclipse the object from my vision, only the reflective medium returns my vision to myself.

Opacity and reflection unite naturally in the case of reflective substances. All metals, for instance, are more or less reflective and show their "true" colour only as long as they are reflective. Unpolished metal may be green or black but never copper, silver, or gold in colour, for the name of their colour is the same as the name for the substance in its purest state.

## **2. Perceptual and Physical Transparency**

In the following I shall argue that with exception of metals the properties of transparency, reflection, opacity and whiteness are independent of the physical properties of objects. I shall argue my case by first explaining the case of transparency, and then transferring the arguments to the cases of reflectance, opacity and whiteness.

My argument develops in four stages:

1. To perceive transparency is to perceive that something is transparent.
2. Empirical transparency is a matter of degree.
3. Physically, transparency is transmittance of light.
4. Physical transparency is neither a necessary nor a sufficient condition for the perception of transparency.

## 1. To perceive transparency is to perceive that something is transparent.

What would absolute transparency look like? Presumably it would be invisible and not look *like* anything at all. Yet it would be something material. I believe that Goethe gives a good picture of how to imagine transparency:

"The space, which we imagine to be empty, could well be taken by us to have the property of transparency. If the space was now filled in such a way that our eyes would not notice the filling, we would have some matter, a more or less material transparent medium which could be a gas, liquid or solid."<sup>2</sup>

If perfect transparency such as this existed it would be invisible. This is also expressed by Hegel when he calls transparency "homogenous neutrality" (Enc.§320), for where everything is homogenous and neutral there can be no visibility because there is nothing to see. In this sense transparency is a limit to our visual perception not unlike the number zero as a limit to counting.

Goethe's filled space becomes visible when either it or the medium surrounding it (most probably air) is of greater density or colour than the other. Thus transparency becomes noticeable either as a gap in something less transparent (a window in a wall, for instance) or as a neutral surrounding. Strictly speaking, transparency is therefore not itself visible, but is noticeable only as the absence of something visible and is in this sense neutral. Perceiving transparency in this sense is not *seeing* transparency: we cannot perceive transparency but we can perceive *that* something is transparent.

## 2. Empirical Transparency is a matter of degree.

Paradoxically, however, even confirming that something is transparent by looking at it is only possible if the transparent something is not perfectly transparent. This follows from the above as, if it is true that the perfectly transparent is by definition invisible then I do not detect anything by sight alone when I encounter something transparent - I do not even detect that there is something transparent in front of me. Were it possible to

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<sup>2</sup> "Der Raum, den wir uns leer denken, hätte durchaus für uns die Eigenschaft der Durchsichtigkeit. Wenn sich nun derselbe dergestalt füllt, daß unser Auge die Ausfüllung nicht gewahr wird, so entsteht ein materielles,

perceive perfect transparency by sight alone, people would not run into glass doors. When I look out of my own window, on the other hand, I can see the window pane - not just because it needs to be cleaned but also because the glass is slightly uneven and distorts some of the objects seen through the glass. Hence in this case I do see something between me and the objects outside. The best empirical case of a perfectly clear transparent object is the case of a crystal or of cut glass. Both are visible through the various reflections and distortions of objects seen in and through the glass, which make the glass itself visible.

Often when we speak of something transparent we do not mean something merely clear but something coloured. Thus we speak of transparent colour filters, skin or flower petals, and transparent, "see through", clothes. Some people distinguish between transparent and translucent objects, meaning by a translucent object one through which we can see the outline of another object but not its colour or its details. Thus some philosophers might even argue that there can be no transparent white but that there can be translucent white.<sup>3</sup> As the difference between transparency and translucency is one of degree, however, I cannot accept this as a good answer to the puzzle. As a medium becomes less and less transparent it becomes more and more opaque, and I find it unnecessary if not confusing to insert a third state of translucency between the states of transparency and opacity.

I conclude that cases of seeing transparency are those cases in which the transparent medium is not perfectly transparent but only more or less so.

"The transparent itself, when seen empirically, is already the first grade of turbidity. The further grades of the turbid up to the non-transparent white are infinite."<sup>4</sup>

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mehr oder weniger körperloses, durchsichtiges Mittel, das luft- und gasartig, flüssig oder auch fest sein kann." (Fl.145)

<sup>3</sup> See for instance, Westphal, p.13.

<sup>4</sup> "Das Durchsichtige selbst, empirisch betrachtet, ist schon der erste Grad des Trüben. Die ferneren Grade des Trüben bis zum undurchsichtigen Weißen sind unendlich."

Goethe, Fl.§148, also §178. See also Westphal (1987) "no transparent medium is transparent in the strictest sense that it transmits all the light incident upon it", p.14.

### 2.3. Physically, transparency is transmittance of light.

The physical explanation of transparency is that a transparent object transmits most of the light incident upon it while an opaque object reflects most of the light. Jonathan Westphal gives an excellent account of the physical explanation of transparency as an answer to the question why there can be no transparent white. He treats the question as simple (pp.19-20): A white surface scatters back or reflects nearly all the light incident upon it while a transparent one transmits almost all the incident light. Since no physical object can both transmit and reflect most of the incident light at the same time, there can be no object that is at the same time transparent and white. Westphal thus makes a connection between the physical and the phenomenal property of white objects even though he admits that this is not a complete conception of whiteness (p.19) and that it would not suffice for a reductive account of whiteness (p.34). While I think that he is right with regard to white objects I do not think that Westphal really answers Wittgenstein's question, which, after all was not about *objects* but about white as a colour.

### 2.4. Physical transparency is neither a necessary nor a sufficient condition for the perception of transparency.

"It is not the same to say: the impression of white or grey comes into being under such conditions (causally), and: it is an impression in a certain connection of colours and shapes."<sup>5</sup>

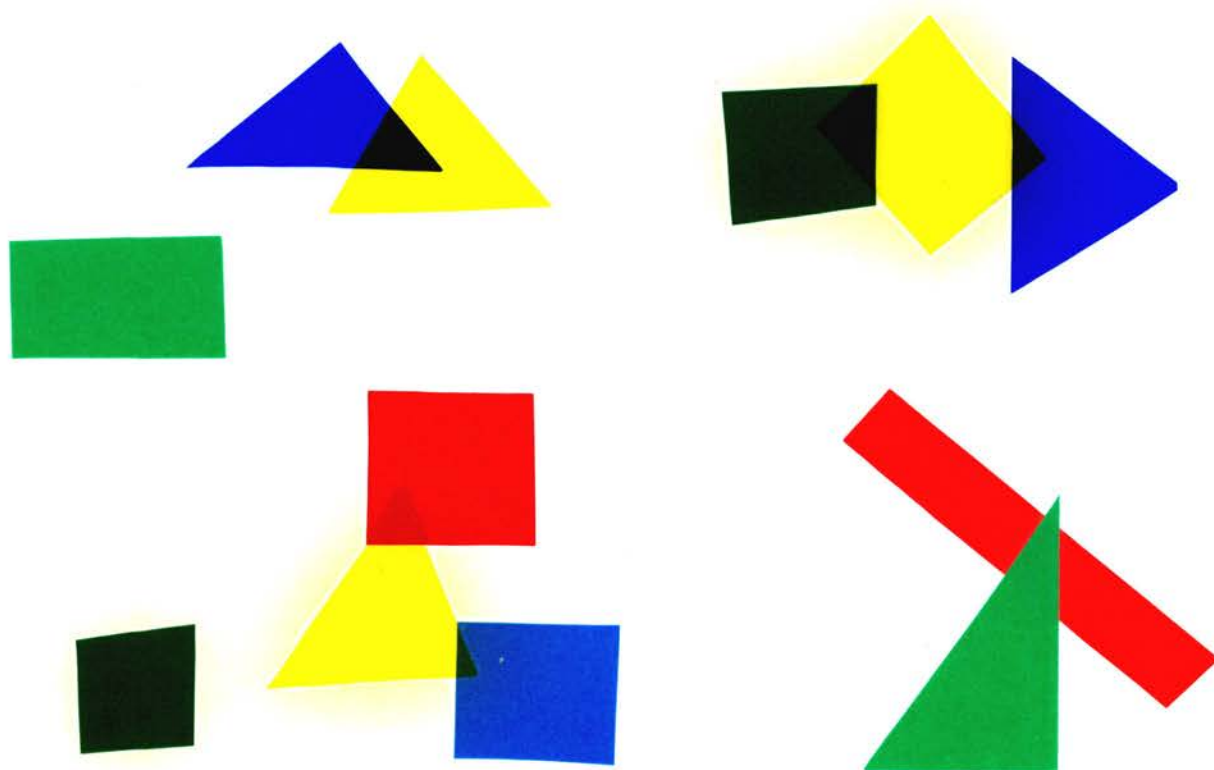
That physical transparency is not sufficient for the perception of transparency is fairly obvious: I do not perceive the transparency of my spectacles when I look through them, nor do I perceive the transparency of the book foil around my book. To perceive the transparency of a physically transparent object two conditions must be fulfilled: first, it must have a visible edge which does not coincide with the edge of the background, and secondly, there must be an object between the transparent medium and the background,

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<sup>5</sup> "Es ist nicht dasselbe, zu sagen: der Eindruck des Weissen oder Grauen kommt unter solchen Bedingungen zustande (kausal), und: er ist ein Eindruck in einem bestimmten Zusammenhang von Farben und Formen." (Wittgenstein, R.C.I, 51)

which beyond the edge of the transparent medium is partially hidden or of a different colour. If, for instance, I found myself in a large room with several windows all of which showed a blue sky, but some of which were only painted blue, I would not be able to tell the difference between them until I saw some object passing behind the real windows. So I need to observe at least three levels of vision - the limited transparent medium, some background, and another limited object - in order to perceive the transparency of the medium (see illustrations below). This fact has been recognised by most of the philosophers which I read. Thus Wittgenstein for instance:

"Transparency and mirror reflection only exist in the (dimension of) depth of the visual field. The impression of a transparent medium is that something lies *behind* the medium. A perfect uni-colourisation of the visual field cannot be transparent." <sup>6</sup>




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<sup>6</sup> "Durchsichtigkeit und Spiegeln gibt es nur in der Tiefendimension eines Gesichtsfeldes. Der Eindruck des durchsichtigen Mediums ist der, daß etwas *hinter* dem Medium liegt. Vollkommene Einfärbigkeit des Gesichtsfeldes kann nicht durchsichtig sein." (RC I,19; III,148,172))

More surprisingly perhaps, physical transparency of the medium is not even a necessary condition for the perception of transparency. The visual arts show that something can look transparent although it is painted with opaque colour pigments. But it does not take an artist's subtle hand to show how this phenomenon works. Simple illustrations suffice to demonstrate this point (see following pages).

Someone might object that these are cases of *apparent* transparency, and that *real* transparency is still supervenient on or even identical with the transmission of light. I agree with this distinction, but wish to stress that I am interested in the *conditions* under which we perceive that something is transparent. (After all we do not perceive transparency itself anyway, as that is invisible.) One might compare the perception of something transparent with perceiving that Hamlet is mad. We use the same criteria for judging his madness as we would use for any real person, and the fact that the actor is not mad is irrelevant (even if in other contexts, i.e. to answer different questions, the difference between a stage play and real characters and events, is of course important).

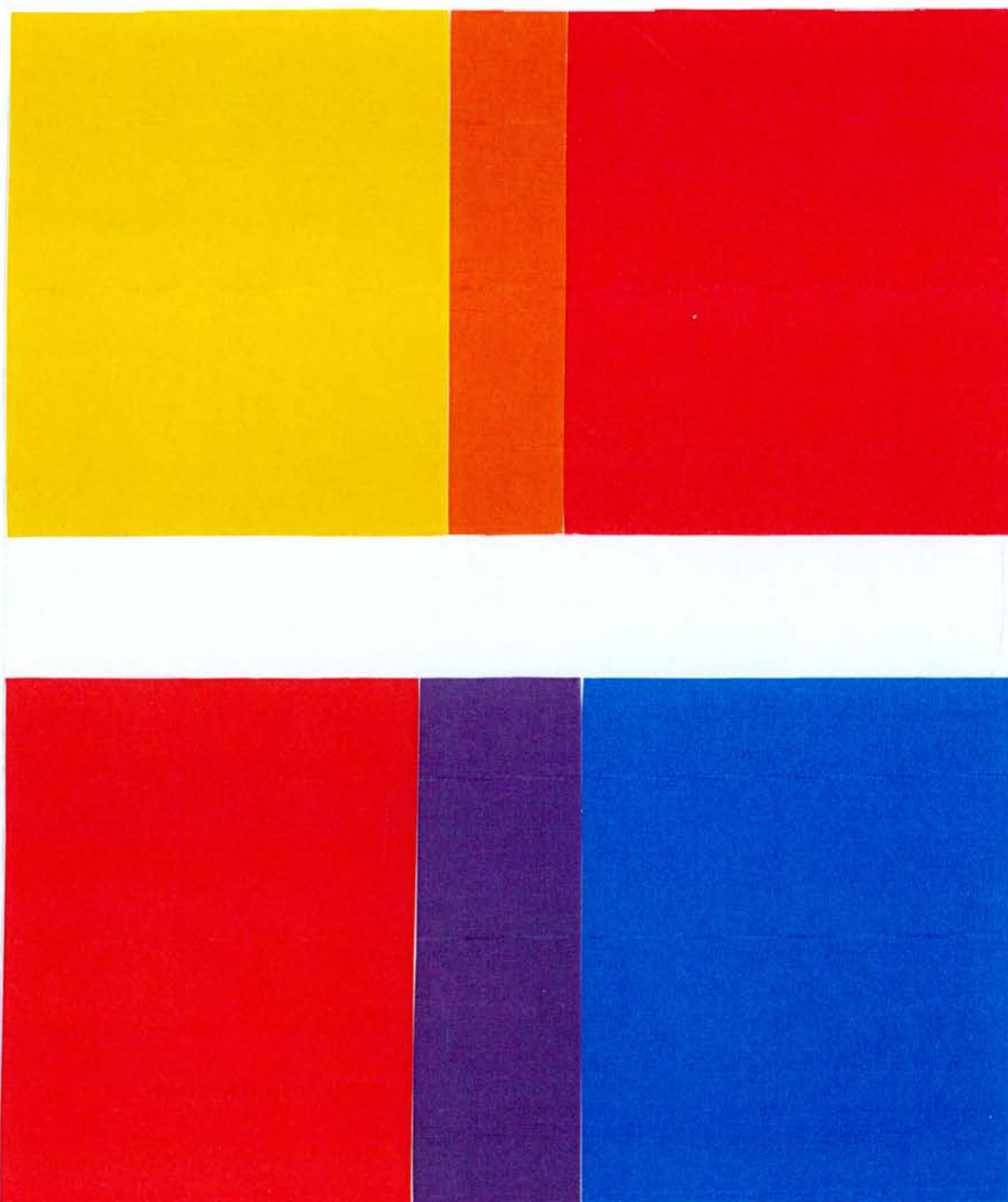
Thus in the case of the colour squares, it is not the physical properties of the paper but the spatial relations of the colour shapes which determines whether we see the middle section as a separate colour or as one of the colours seen through the transparent shape of the other. Which of the two squares we see as transparent and overlying the other one depends on the relative lightness of the middle section. If this section is quite light it will be seen as part of the lighter of the two colours, if it is relatively dark it will be seen as part of the darker one. Depending on the general lightness of all the colours we furthermore perceive the effect of additive or subtractive colour mixing (see Arnheim, pp.250-251). Surprisingly enough, this can also be achieved if we choose black and white squares, so that in one sense at least we *do* see transparent white. It is rules like these that Wittgenstein refers to when he writes:

"And this is not an axiom of physics but a rule for the spatial interpretation (Deutung) of our field of vision. One could also say, it is a rule for a painter."<sup>7</sup>

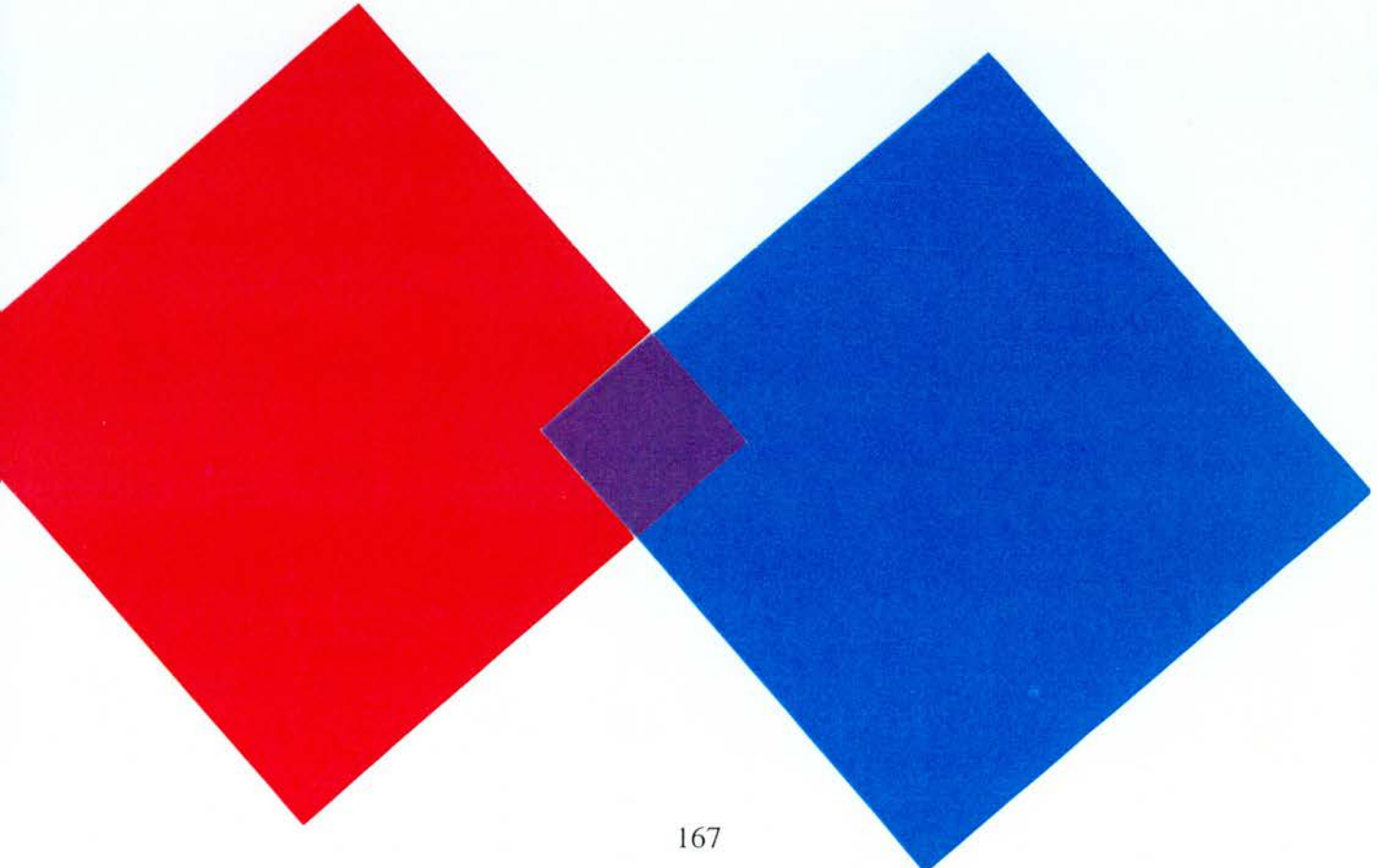
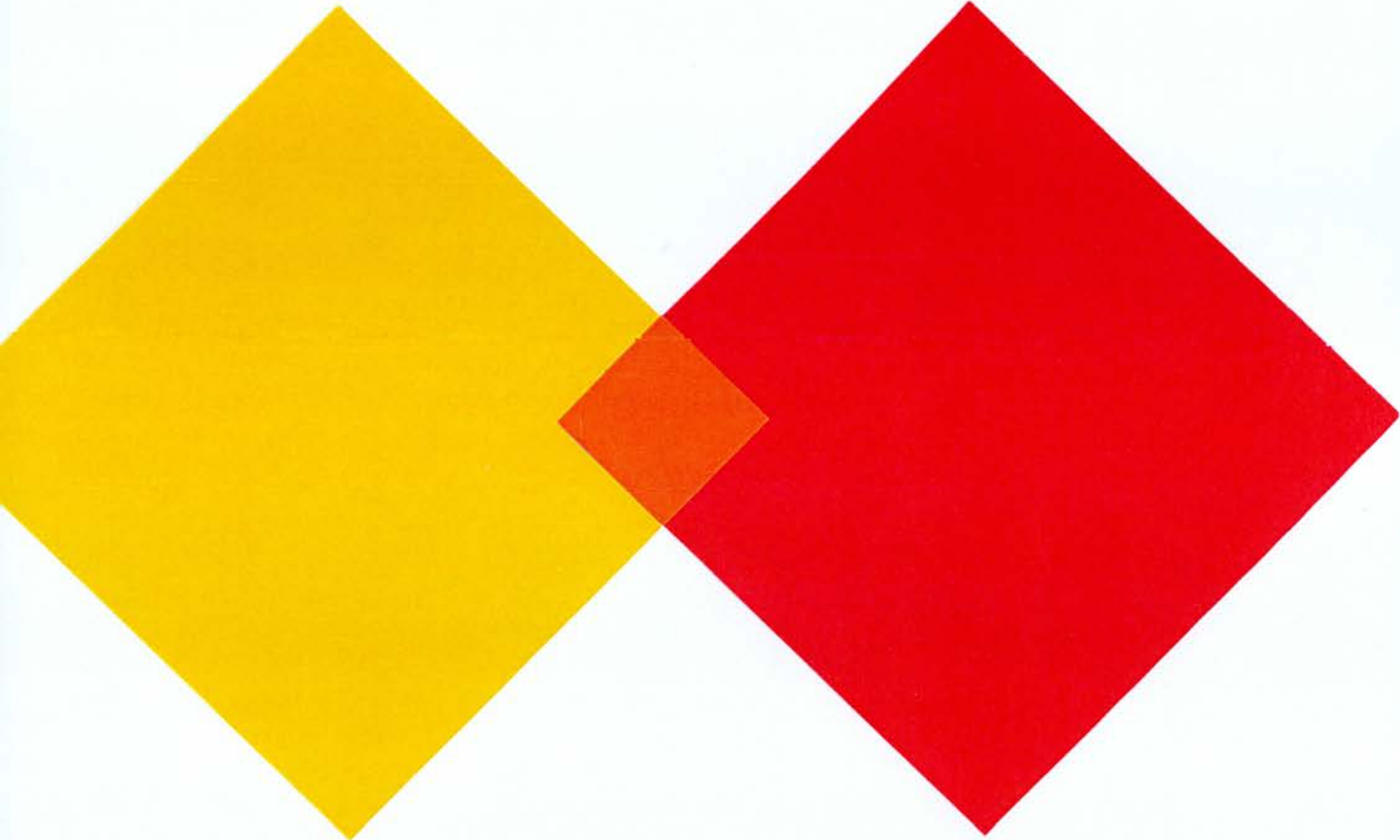
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<sup>7</sup> "Das ist hier nicht ein Satz der Physik, sondern eine Regel der räumlichen Deutung unserer Gesichtserfahrung. Man könnte auch sagen, es sei eine Regel für den Maler." (R.C.III, 173)

To see that physical transparency is not a necessary condition for the perception of transparency, please compare the figures on these three pages. Here we see three colour shapes of unequal size beside each other:

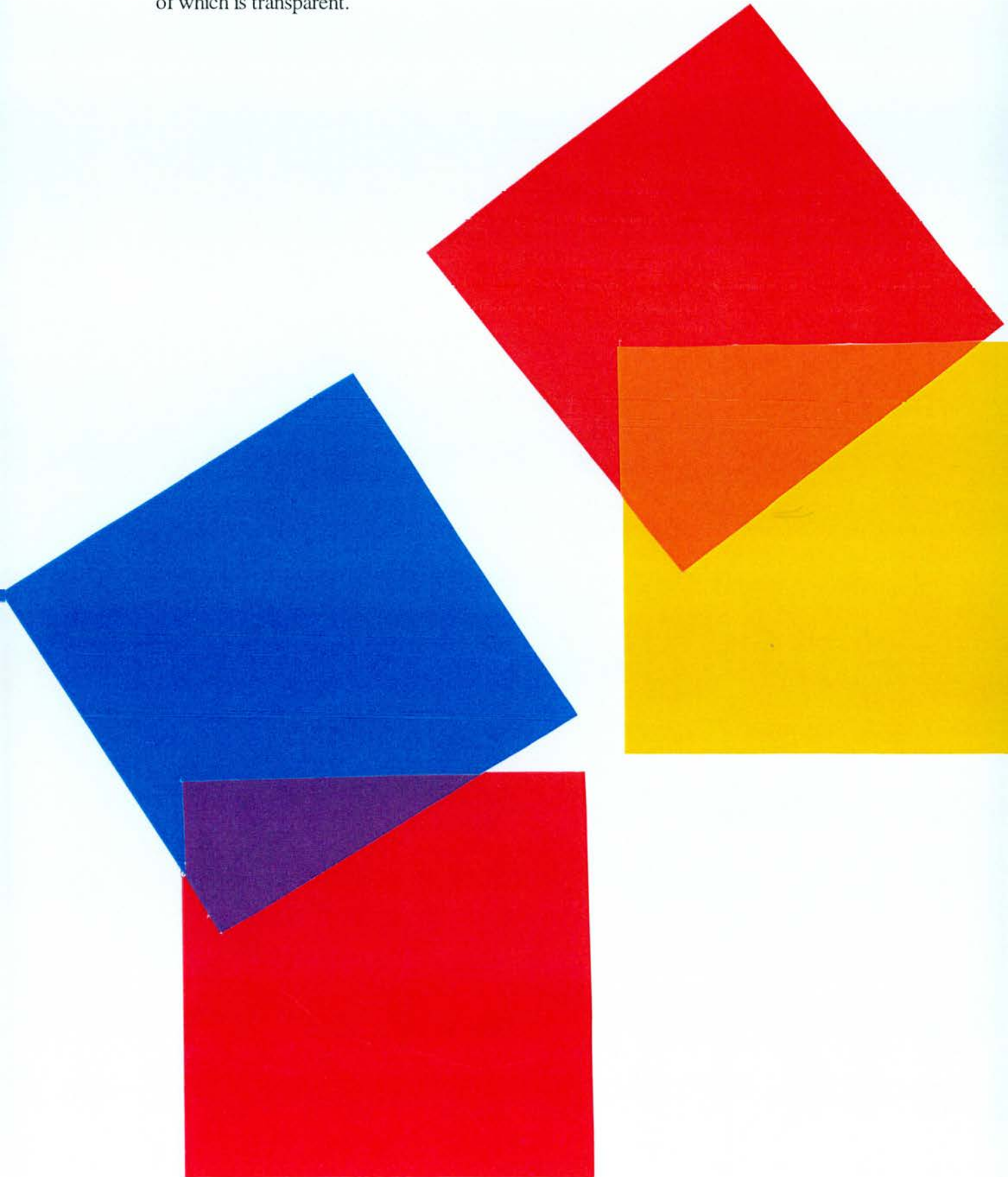


These combinations can be seen either as two large squares with a small square superimposed in the middle, or as two overlapping large squares one of which is transparent.

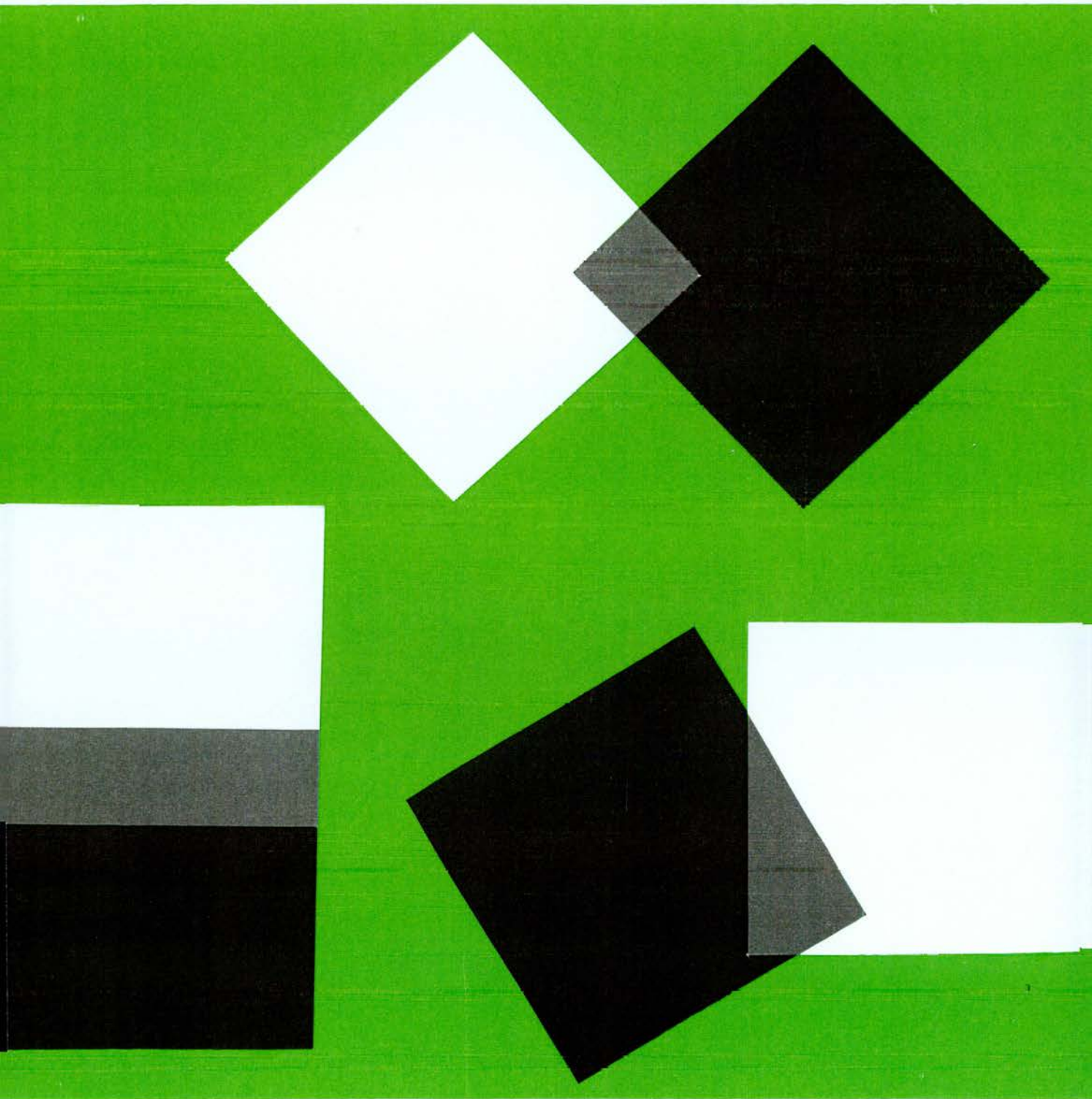


Physical transparency is not necessary for the perception of transparency

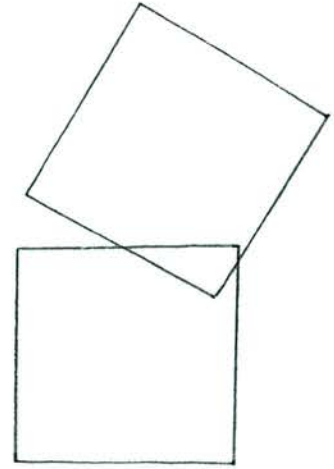
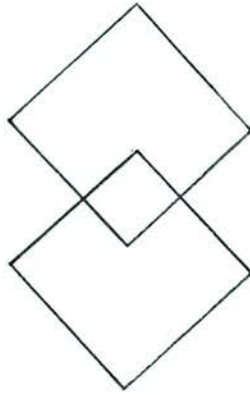
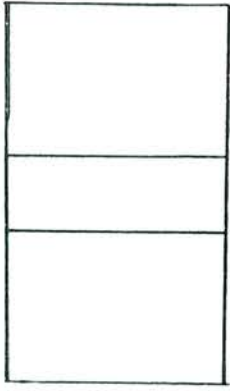
These shapes at last, are difficult to see as anything other than two overlapping shapes, one of which is transparent.



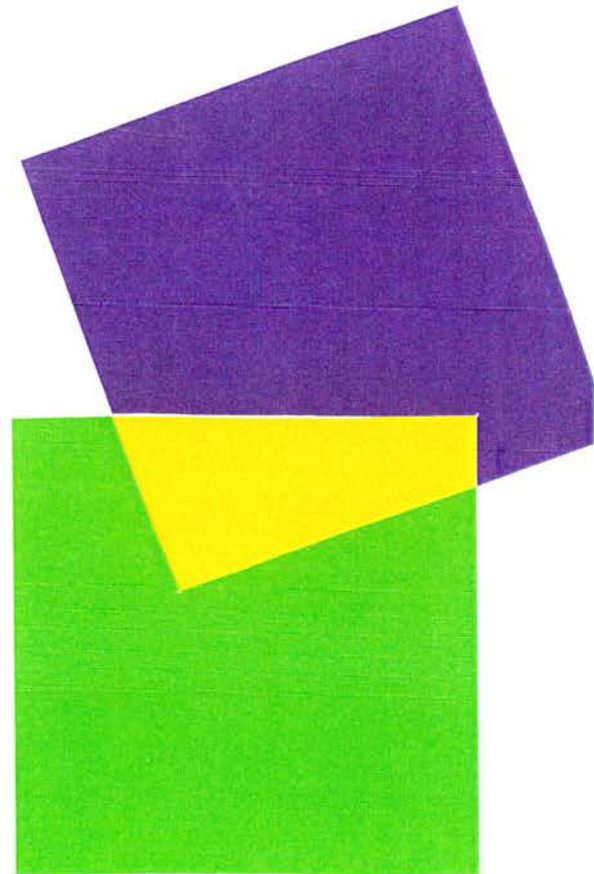
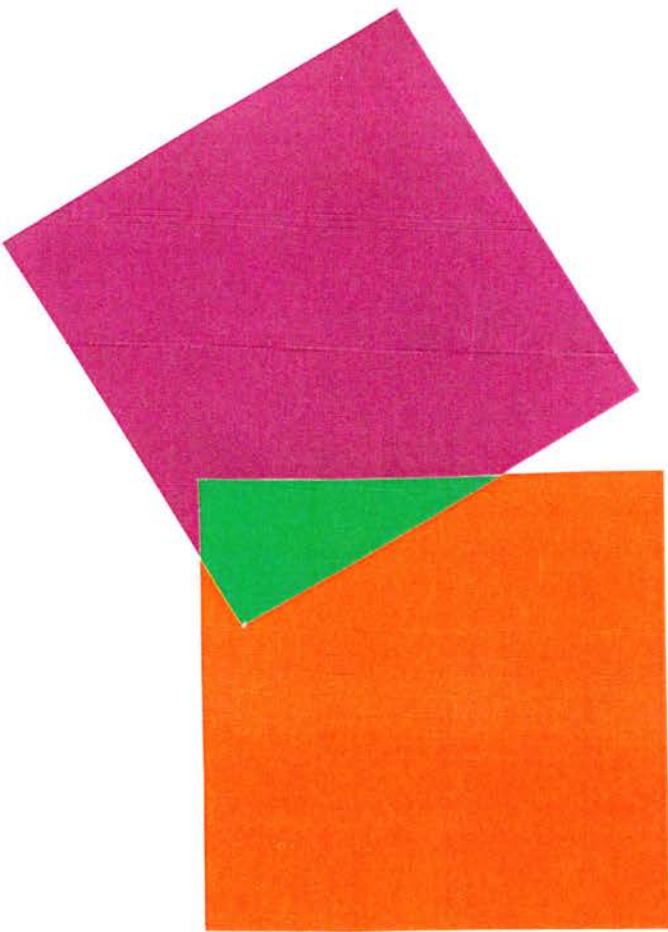
Interestingly the same rule applies to black and white examples, so that we take either the black or the white square to be transparent. This illusion is much like an Escher drawing or the Müller-Lyer diagram in that we *know* that the white and the black shape cannot be transparent but we yet see them this way.



A simple abstraction shows the importance of shape in seeing transparency.



Unlikely colour combinations, however, override the effect caused by the combination of shapes.



## 2.5. Solving two of Wittgenstein's puzzles

Bearing in mind my explanation of transparency as an essentially spatial concept, let us now have another look at Wittgenstein's puzzling about "the indeterminacy of colour concepts": that there are no different names for opaque and transparent colours is one puzzle, and the other is how we can compare the colour of a green piece of glass to that of a green piece of cardboard.<sup>8</sup>

From the fact that transparency can only be perceived if we have three levels of vision we know that there is indeed no way of distinguishing the colour of green glass on a white surface from a green surface with a clear piece of glass on it. This is one of the reasons why we do not need two words for each colour - one for transparent appearances and one for opaque ones. For this would lead to a constant possibility of error (mistaking the first case for the second and vice versa). And since we have no difficulty in naming the colour of the green glass on the white piece of cardboard "green", a splitting of one useful concept into two is unnecessary.

Furthermore, one could extend the puzzle to other spatial concepts to show how superfluous the distinction into two concepts can be. Thus one might propose to have two words for things seen from the front and things seen from the back, or one for birds sitting or hopping and another for birds in flight. Especially if one also extended this option to non-spatial concepts (sounds, for instance) one would soon arrive at an infinite number of ways of splitting up concepts, which one had previously further qualified and thus avoided confusion. If in doubt, we can simply say "transparent green" (but if we talk about glasses we may assume their transparency and require no further qualification), or "the shape of a bird in flight" (which again is unnecessary if we are all looking up at the sky anyway).

A second reason for not having two separate words for transparent and opaque colours is that transparency is a matter of degree. Thus it might be difficult to apply the right word to borderline cases. To answer Wittgenstein's question (R.C.I,18): Yes, a transparent green glass can have the same colour as an opaque piece of paper.

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<sup>8</sup> See RC. I 17,18,19,24,46; III 147,181,182,242.

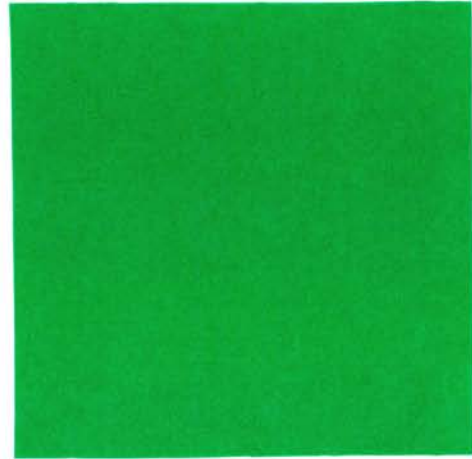
Wittgenstein's second question as to what kind of glass has the same colour as a colour sample on paper (R.C.I,24), is about colours that are blends of colours with white, such as pink or violet. Would a slightly tinted red piece of glass on a white piece of paper look the same shade of colour as a strongly painted pink on paper? The answer is no, (try it out), but a clear piece of glass over a red piece of paper looks the same as a red piece of glass (of the same shade of red) over a white sheet of paper.

Wittgenstein's question of how opaque pigments can represent a transparent green glass in a painting (RC.I.18,24; III,181) can now also be answered: We do not require two sets of colour terms, one for colours on the palette and one for colours as represented, because these are two frames of reference: We can quite literally take the frame of the painting as one limit of reference so that the complex of opaque colour dots or brush strokes can as easily make a certain shade of green glass appear in the painting as they can represent a certain person. If, on the other hand, we look at the painting with a magnifying glass we will find only opaque colour dots and no transparent green glass. (Note how our language alone explains this puzzle: the subjects (in the grammatical sense) to which we apply the predicates "transparent" or "opaque" change when we look through the magnifying glass - we no longer look at the same things.)

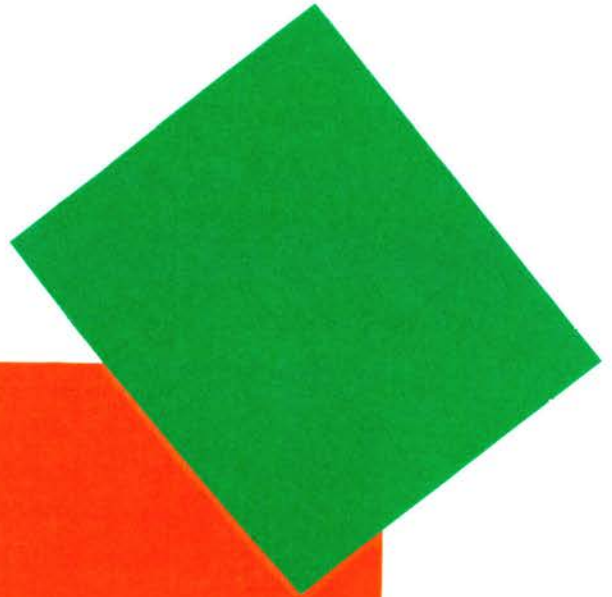
Similarly, the way in which we compare a green piece of glass to a green piece of paper depends on the context: If we place both on top of a white piece of paper they may be of the same colour, but if we hold them over a red surface the green transparency will look almost black (for illustrations see next page). Please note that if we hold them against a red light source, the green transparency still looks green (provided the light is reasonably bright), but the piece of paper will look considerably darker.

Comparison of transparent and opaque examples of green

1. Although they have a different texture, the two squares below can be said to have the same colour.



2. The green transparency is however perceived to be transparent once it is held over a differently coloured surface.



### 3. Whiteness and Transparency

Whiteness and transparency are related in several aspects: First of all, both transparency and whiteness are ideal concepts. Wittgenstein, citing Lichtenberg, states that few people have ever seen pure whiteness, so that the concept of pure whiteness could hardly be *abstracted* from empirical phenomena but must rather be a *constructed*, ideal concept. So, just as we hardly ever come across something perfectly transparent we neither come across something perfectly white, and yet we understand the concepts "perfect white" and "perfect transparency".<sup>9</sup>

This means that almost all of the cases which we call white are in fact slightly or partially coloured. As I said in section one (1.5) transparency and whiteness are related in that they both take on any other colour, and in that any colour they take on makes them darker (provided of course that they are in a well lit environment).<sup>10</sup> This process can best be observed when a transparent and a white medium are mixed with each other: the lightness of the mixture depends on the spatial relations between the mixture, the light source and the perceiver. Thus a milky white liquid is lighter than a completely white liquid if the light shines through it (we see the light through it), but it is darker if we have the light on our side of the medium and see a dark background through it. Accordingly the same liquid is darker than something purely transparent if held against a light source, but lighter if held against a dark background. Hence any mixture makes both transparent and white substances darker if they are viewed under the circumstances in which they themselves appear lightest.

Finally, transparency is not a property of colour and hence non-transparency not a property of whiteness.<sup>11</sup> Rather, white and transparency are concepts within different frameworks: Transparency is a concept which requires depth of the visual field and the

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<sup>9</sup> Wittgenstein, RC.I,3,5; III, 35,36,160.

<sup>10</sup> This process of darkening extends as far as their conceptual opposites, opacity and black. In the case of transparency, something white or yellow can be completely dark if, for instance, the only windows in a room are painted with them (and they are perfectly opaque). From the outside of the room, however, the individual window panes are as dark or light as the intrinsic lightness of each colour. Thus the darkening process of transparency again depends on spatial relations.

<sup>11</sup> See also Wittgenstein, RCI,45; III,147.

visual interpretation of something as transparent,<sup>12</sup> whereas whiteness is a substance or surface colour (causes lack of depth). Whiteness and transparency are thus not incompatible in the way in which red and green are incompatible, but they refer to different aspects of the visual world. They are thus comparable to length and volume: while it makes sense to say that an object of a certain depth, width and length has less volume than an object of the same depth and width but greater length, it does not make sense to say that volume is a property of length. Similarly, a colour of a certain hue, lightness and saturation will be less transparent than one of the same hue and lightness but greater saturation, yet transparency is not a property of saturation and hence not contrary to white in the sense in which black is contrary to white.<sup>13</sup>

White like transparency is thus absence of colour or not darkening light.<sup>14</sup> A purely white room should thus be just as bright as a space in an empty, hence transparent, aquarium when lit in the same way (I may now speak of "purely white" meaning "as pure as empirically possible" - just as the aquarium will of course only be as transparent as empirically possible). That white is not as bright as light itself, can be seen in falling snow: on the ground the snow, be it in light or shade, is the lightest colour around us; but seen against even the relatively grey winter sky or against an orange street-lamp the snowflakes are comparatively dark. While this is due to their own shadow it yet shows that lights are always brighter than surface colours (and white is only the brightest colour within the group of surface colours).<sup>15</sup> So it seems that transparency is a potential material basis for the lightest colour in space, just as whiteness is the lightest colour on a surface.

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<sup>12</sup> See Wittgenstein, RC I,19; III,150

<sup>13</sup> Please note that "saturation" is defined as "free from an admixture of white" (Concise Oxford Dictionary, 1990).

<sup>14</sup> This is hinted at in Wittgenstein (RC,I,30); see also Westphal, pp.21,26,32.

<sup>15</sup> See also section 4 on the mixing of white.

"White as *substance colour* ... is lighter than any other substance colour... Here colour is darkening, and if it is withdrawn from the substance there remains whiteness, and this is why we cannot call it colourlessness."<sup>16</sup>

The only case of true colourlessness is transparency, because we also have to withdraw whiteness from transparent material such as glass in order to obtain transparency, and this is a significant step: together with the whiteness of an otherwise colourless material we lose all visible substance. For we are left with transparency, which, as I argued above, could be a gas, liquid or solid - in other words, it could be anything whatsoever and in this sense is not a substance.

"Ideal whiteness is the theoretical limit of the process which gives substances their colour. Chromatically coloured objects change both the quantity and the colour of light. White objects do neither. In this respect they are comparable to transparent objects."<sup>17</sup>

Finally, the idea of a perfect white is also aesthetically linked to the perfection of transparency. For Goethe

"The perfected turbidity is whiteness, the most equal, the lightest, first non-transparent filling of space."<sup>18</sup>

"Pure water crystallised as snow appears white, as the transparency of the individual parts do not create a transparent whole ... One could call the contingently non-transparent state of the pure transparent "white", just as a crushed glass appears as a white powder."<sup>19</sup>

It thus seems that the aesthetic difference between whiteness and transparency is one of natural order, and that in the evaluation of natural order Goethe judges that

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<sup>16</sup> "Weiss als *Stofffarbe* ...ist heller als jede andere Stofffarbe..Hier ist die Farbe eine Verdunkelung, und ist dem Stoff jede solche entzogen, so bleibt Weiss, und darum kann man es nicht farblos nennen." (RC,I,52).

See also Schopenhauer (S&F,§2): although white is softer and more luminous than light, white too causes complete activity of the retina, and is thus by definition the lightest colour.

<sup>17</sup> Westphal (1987), p.30

<sup>18</sup> "Die vollendete Trübe ist das Weisse, die gleichgültigste, hellste, erste undurchsichtige Raumerfüllung." (Fl.147 - please ignore for now that I treat white as a surface colour)

<sup>19</sup> "Reines Wasser zu Schnee kristallisiert erscheint weiß, indem die Durchsichtigkeit der einzelnen Teile kein durchsichtiges Ganzes macht...Man könnte den zufällig undurchsichtigen Zustand des rein Durchsichtigen Weiss nennen, so wie ein zermalmt Glas als ein weisses Pulver erscheint." (Fl,495)

"Transparent bodies are on the highest level of inorganic matter. The nearest next level is pure turbidity, and whiteness can be seen as perfected pure turbidity."<sup>20</sup>

As ideal concepts transparency and whiteness were treated with reverence by German idealists. It is not always easy to tell whether they write metaphorically or literally about these concepts (after all, the crystal was one of the main symbols in Romantic art). Although not an idealist himself, Goethe can take some of the responsibility for the more mysterious though often also more beautiful passages in the writings of Hegel and Schelling. Leaving poetic connotations aside, Hegel understands the phenomenon of transparency very well. He calls it the "first determinedness" ("erste Bestimmung") of any physical object in-itself (an sich). The idea is that a physical object, in order to be an object, must first have something which itself is undetermined but to which the other properties of the object may belong. Transparency might be considered as something like the tabula rasa of visibility. To make it visible we need at least a difference in specific weight, i.e. density between two objects: Differences in density leading to reflections and refractions are, according to Hegel, properties of the for-itself (für sich). So the first determination of an object for-itself is weight, and weight leads to the particularisation of visibility as it enables us to distinguish between different objects:

"What is essential is that a medium is only transparency as such, and that only the relation between two media of different specific weight will be the affecting [power] for a particularisation of visibility, - a determination which at the same time is merely taken to determine the place, i.e. by purely abstract density. A relation of media only effectively (=affectingly) takes place, when one is set *in the other* - namely just as visible - as *visual space*. This other medium gets, so to say, infected by the immaterial density of the one set within it, so that it shows the visual space of the picture within it as the limitation, which it itself (the medium) suffers and thus limits."<sup>21</sup>

I interpret this passage to mean the following: When we think of air we usually think of it as being more or less everywhere. Only when another medium, say water,

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<sup>20</sup> "Durchsichtige Körper stehen auf der höchsten Stufe unorganischer Materialität. Zunächst daran fügt sich die reine Trübe, und das Weiße kann als die vollendete reine Trübe angesehen werden." (Fl.494, also Fl.496).

<sup>17</sup> "Worauf es ankommt, ist, daß ein Medium nur schlechthin Durchsichtiges überhaupt ist, und erst das Verhältnis zweier Medien von verschiedener spezifischer Schwere das Wirksame wird für eine Partikularisation der Sichtbarkeit, - eine Determination, die zugleich nur ortsbestimmend, d.h. durch die ganz abstrakte Dichtigkeit gesetzt ist. Ein Verhältnis der Medien als wirksam findet....allein statt, indem das eine *in dem Anderen* - nämlich hier nur als Sichtbares - als *Sehraum* gesetzt ist. Dieses andere Medium wird von der immateriellen Dichtigkeit des darin gesetzten sozusagen infiziert, so dass es in ihm den Sehraum des Bildes nach der Beschränkung zeigt, die es selbst (das Medium) erleidet und ihn damit beschränkt." (Hegel, Enc.§318)

Goethe too speaks of inner pressure making glass more turbid than it would otherwise be (Fl.452).

comes into contact with air do we find air to have a boundary. It is this limiting boundary between air and water, where the density of the water does not allow the air to enter it, which makes both visible - the least we will see is the boundary itself which shows us that there are two individual substances. According to Hegel, and in true Romantic tradition, this process is internalised in the crystal.<sup>22</sup> Even the clearest crystal is always visible because of the boundaries within it. The beauty of crystals did not just fascinate the German Romantics. Wittgenstein too writes that the highest simplicity of an a priori order of the world must not be *turbid* or insecure - "It must rather be of the purest crystal" (PI.97). He emphasises not just the transparency but also the symmetry of crystals, which is naturally impressive *because* of the crystal's transparency which shows its inner and outer perfection. The crystalline perfection through and through is therefore a kind of mathematical perfection which is immediately apparent to the observer: "Remember that one can sometimes be convinced of the truth of an opinion merely by its simplicity or symmetry..."<sup>23</sup>. It is only when one questions the crystalline perfection philosophically that one introduces turbidity ("*philosophische Trübe*", Verm.Bem. (C&V), p.530).<sup>24</sup>

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<sup>22</sup> Goethe observed that glasses which are empirically as transparent as possible are still slightly turbid through their inner pressure. (Fl.452).

<sup>23</sup>"Bedenke, daß man von der *Richtigkeit* einer Anschauung manchmal durch ihre *Einfachheit* oder *Symmetrie* überzeugt wird." (*On Certainty*,92)

See also Verm.Bem.(C&V) p.509 where Wittgenstein compares the mathematician's admiration of a theorem to that of a crystal.

<sup>24</sup> Wittgenstein does not use the metaphor of the crystal consistently, however: whereas most of the time he seems to admire the crystal in the Romantic tradition as something to aim for (and something he presumably aimed for himself in the *Tractatus*), he also sees the danger of this approach to philosophy: An order as pure as a crystal is a prescription, even a prejudice, of the world, and too pure and icy to yield valuable results (PI.107).

#### 4. The Mixing of White

Possibly the most sensitive issue arising from Goethe's *Farbenlehre* is whether light is simple, as Goethe claims, or whether it consists of coloured rays. Related to this is the question whether the colour white can be mixed from other colours. This question is more clearly understood nowadays as philosophers and scientists have become aware of the distinction between additive and subtractive colour mixing. In this section I shall first look at the defence of white as necessarily unmixed, and then show in what sense we nevertheless can speak of mixing two or more colours to yield white.

##### 4.1. Defence of white as unmixed: Goethe and Wittgenstein

Visually, white does not appear to consist of other colours, in the way in which orange, for instance, appears to consist of red and yellow. But that in itself does not prove that there could not be a white mixed of other colours - for objects too may appear to be made of one piece of material ("aus einem Guß") but reveal several parts at closer examination. As we shall see, the argument about the mixing of white hinges on whether the object of such close examination is the same as that of first appearance. Thus it is undoubtably true that so-called "white" light can consist of an infinite number of combinations of light of various wavelengths. And it is also true that the spectrum correlates each of these wavelengths with a particular colour. But it does not follow that "wavelength X" and "colour Y" are the same in every respect. So if we assume that Newton's theory is correct in some contexts (namely those where wavelengths are treated as identical to colours), then the defence of white as unmixed must take place in a different context where this is not the case, such as the conceptual context of everyday language. In this latter context, Goethe and Wittgenstein argue convincingly that white cannot be mixed of other colours. They thus prove wrong Newton's claim that white consist of seven (or however many) *colours*, not that white cannot be produced by mixing lights of various wavelengths. Their argument runs as follows:<sup>25</sup>

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<sup>25</sup> Wittgenstein R.C.I.72; III,126; Goethe Fl.556-9

1. White is by definition the lightest colour.
2. Any colour other than white contains some dark quality (skieron).
3. The mixture of colours is the addition of their qualities.
4. Hence, any mixture containing a colour with dark qualities (ie. a mixture of colours other than white) includes some element of darkness, and therefore is not white (see premiss one).<sup>26</sup>

As we shall see, we can more or less keep the three premisses of this argument without accepting the conclusion, but first I shall look at the argument as it stands. That white is by definition the lightest colour I accept without further argument. But this need not imply that white is simple. Wittgenstein points out a linguistic reason for the simplicity of white (mixed colours can be described by their additives, but white cannot: thus lilac might be said to be a whitish-reddish-blue, but white cannot be said to be a yellowish-reddish-blue (RC.I,72; III,126)). While Wittgenstein is right about this, his example also applies to the primary colours red, blue and yellow, (and green) which cannot be described as mixtures or combinations either.<sup>27</sup> There appear to be two issues involved here: one, that white, black and the primary colours are by definition simple, and the other that the lightest colour cannot include dark qualities. The first claim is true a priori, but the second claim needs further clarification of the concept of inclusion involved (conceptual, physical, physiological etc.).

The argument whether white can be a mixed colour rests on the notions of mixture and inclusion but also on the ontology of colour: If we take a naively realist position then, as white is phenomenologically simple, it must really be simple. This is Goethe's position if we leave aside his religious attitude of white as representative of Light/Truth/God (which qua belief in one unified God demands that light and white too are unified).

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<sup>26</sup> See also Goethe, Fl.556: "All colours mixed together retain their general characteristics as skieron, and as they are no longer seen side by side [but mixed together] there is no sensation of totality, no harmony, and thus grey comes into being." - "Sämtliche Farben zusammengemischt behalten ihren allgemeinen Charakter als skiera, und da sie nicht mehr nebeneinander gesehen werden, wird keine Totalität, keine Harmonie empfunden, und so entsteht das Grau, das, wie die sichtbare Farbe, immer etwas dunkler als Weiß und immer etwas heller als Schwarz erscheint."

Also, mixed colours transfer their darkness to the mixture: "Die zusammengemischten Farben tragen ihr Dunkles in die Mischung über." (Fl.559)

Wittgenstein's emphasis on linguistic convention does not make ontological claims but comes to the same result: If we determine the nature of white within a particular language game, and if this language game prescribes white to be the lightest colour, then white qua lightest colour cannot contain darkness, since the conceptual polarity between light and darkness (which I assume to be part of the language game) demands that the *lightest* colour contain no dark. (If an empirically white object contains dark patches, such as most white things do, we call these things "off-white", or "cream" and thus acknowledge that they are not "pure" or "brilliant white".) Wittgenstein's statement that experiments with the spectrum can neither assert nor falsify that white is simple therefore follows, as experiments with the spectrum use a different concept of white in the first place (R.C.I,72; III,126).

The only context in which it makes sense to question the simplicity of white is one in which we assume that the reality of whiteness is something other than what it appears to be - be it a physiological process, invisible particles, wavelengths or whatever else is itself invisible. Before I discuss these other contexts, however, I shall have a brief look at a Goethean phenomenological argument (though not explicitly expressed by Goethe).<sup>28</sup>

For Goethe white *in nature* cannot be a mixed colour. Just as any milky liquid through which we see other colours will take on shades of these other colours and therefore not be white in the same patches in which it is transparent, any mixture of opaque colours will not be white in those parts in which it is any other colour than white. Thus a clear crimson in a mixture with blue is no longer crimson, yellow in a mixture with red is no longer yellow, and white in a mixture with green is no longer white. But while many mixtures of colours may be difficult to name or to recognise for a second time, we can *always* be sure that it is not white because anything that looks even slightly dark is not white (and even completely colour-blind people can recognise that it is not white).

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<sup>27</sup> See also ch.VIII on primary colours.

<sup>28</sup> Goethe of course wanted to prove Newton wrong on his own territory rather than give a purely phenomenological or conceptual analysis. As I showed in chapter III (sect.3.3) Newton's conclusion that light consisted of colours, so that colours could be mixed to yield white, is not the only possible conclusion to be drawn from the facts involved in the experiment. (See also Sepper (1988, ch.3) who gives a detailed analysis of Newton's and Goethe's experiments regarding the mixing of white.)

I conclude that white is conceptually simple and ideal ("the lightest colour"), a conclusion supported by the phenomenological qualities of white. This does not imply that white cannot physically or physiologically consist of other colours.

4.2. Questioning the second premiss: "Any colour other than white contains some dark quality".

We can supplement premiss two by adding that any colour other than black and white contains *both* some dark and some light qualities. While I am on Goethe's side for most of the argument, because light and white are phenomenologically as well as conceptually simple, and because it is hard to understand how we could mix several dark colours to obtain a lighter colour, this only applies to material colours (or what I call objective colours).

Coloured lights, on the other hand, may not be as light as so called white lights of the same strength, but they are still qua lights lighter than their surroundings. Thus a red light (seen close by) is brighter than a piece of white paper seen at the same distance. Accepting premiss three, that the mixing of colours is the mixing of their qualities, it is possible to understand the mixing of coloured lights as addition of light rather than of darkness. Should we be able to add enough coloured lights to get a bright dazzling effect, we may get light itself or its material representative white. So, by keeping my premisses from above and shifting the emphasis of premiss two I can argue that in order to produce the lightest colour I just need to mix the light qualities of each colour and leave out the dark qualities. How this can be done is first shown by Schopenhauer (see 4.4).

4.3. Premiss three: "The mixing of colours is the addition of their qualities"

Before I discuss Schopenhauer's solution to the mixing of white I should like to discard an obvious objection to premiss three: Wittgenstein draws attention to the fact that black and white are special cases for the mixing of colours because they alone mix with

all other colours as well as with each other (R.C.III,85). When it comes to the mixing of white they thus form a simple linear formula in which the mixture gets lighter (i.e. closer to white) the more white is mixed in. Similarly, red mixed with blue will yield a mixture with both reddish and bluish qualities and the more red we add the redder the mixture will be. When we mix red with green, however, the mixture will not have both reddish and greenish qualities. So it seems that hue - unlike darkness - is not a quality that can be mixed in a simple process of addition. As I shall show in my next chapter this is due to the fact that hue can best be understood by reference to a two-dimensional representation, such as hue circle, triangle or square. In any of these, complementary colours lie exactly opposite each other. If the addition of hue qualities is represented by vectors, a reddish yellow will form a vector between red and yellow but more in the direction of yellow, while a yellowish-red will lie in the same segment but closer to red. Complementary colours will by definition pull in opposite directions and thus cancel each other out to yield a neutral grey or white (depending on the mixing process applied - see below).

#### 4.4. Schopenhauer's solution

Schopenhauer devotes a whole chapter on the production of white from colours (§10) and introduces an important distinction. Because Schopenhauer equates colour with the activity of our eyes and brains, he distinguishes between the external causes of colour and their effects on our eyes. Regarding the effect alone, which in true Idealist tradition is what we start with, the possibility of the production of white is given by Schopenhauer's theory of colour itself: as every colour is partial activity of the retina, and only white is full activity of the retina, the white-effect can be caused by anything that causes full activity of the retina. As each colour is a particular partition of the retina we can attain full activity of the retina by adding its complementary colour. But while the argument is clear and simple once the premisses are accepted, Schopenhauer is well aware that

"Only the experiment of producing white from physical, or even from chemical, colours can produce real conviction; but here there is a special difficulty. If we want to

remain within these colours, then we have actually passed from the colours to their causes,..."<sup>29</sup>

Schopenhauer wants to remain within the effects, for

"In consequence of our theory, the production of white from two colours rests simply and solely on a physiological ground..."<sup>30</sup> So, "...these two colours must be fully and actually united on the retina itself for the production of white, so that the two separated halves of the retina's activity are stimulated *simultaneously*, producing its full activity, white."<sup>31</sup> "But this can happen only by the two external causes, each of which excites in the eye the complementary colour of the other, acting at once simultaneously and yet separately on one and the same spot of the retina."<sup>32</sup>

After Schopenhauer has a priori established the conditions under which white can be produced from other colours, he can see why Goethe failed in his attempts to produce white: Goethe and his followers mixed colour pigments and triumphantly pointed to the dirty grey they had produced, believing to have thus refuted Newton's theory. When colour pigments or other chemical colours are mixed, however, they add simultaneously but not separately on the eye: thus not only their lightness values but also their darkness values are added. The dark qualities of colour are, however, their material causes which produce an unattractive "oyster grey" (Hegel), a "caput mortuum" (Schopenhauer), which is the dead material once the liveliness of the individual colours is lost.

Schopenhauer thus points to an essential distinction: Since it is the material, turbid, skieron aspect of colour that causes the dirty grey, the production of white requires clear colours that are as little turbid or material as possible.

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<sup>29</sup> "Eigentliche Überzeugung kann nur das Experiment der Herstellung des Weißen aus physischen oder gar aus chemischen Farben bewirken. Hier ist man aber immer einer besondern Schwierigkeit unterworfen. Wenn wir nämlich uns an diese Farben halten wollen, so sind wir eigentlich von der Farbe abgegangen zu der Ursache,..." (S&F §10, p.243; Payne, pp.41-42).

<sup>30</sup> "Die Herstellung des Weißen aus zwei Farben beruht unserer Theorie zufolge einzig und allein auf physiologischem Grunde..." (ibid)

<sup>31</sup> "Solche zwei Farben müssen zur Herstellung des Weißen aus ihnen ganz eigentlich wieder vereinigt werden, und zwar auf der Retina selbst, also dadurch, daß die beiden gesonderten Hälften der Tätigkeit dieser *zugleich* angeregt werden, wodurch dann ihre volle Tätigkeit, das Weiße sich herstellt." (S&F, p.243-244, Payne, p.42)

<sup>32</sup> "Dies kann aber nur dadurch geschehn, daß die zwei äußern Ursachen, jede von welchen im Auge die Ergänzungsfarbe der andern erregt, einmal zugleich und doch gesondert auf eine und dieselbe Stelle der Retina wirken." (ibid)

"In chemical colours, therefore, by reason of their material nature, the production of white from a pair of colours will possibly never be demonstrated, unless some special modifications supervene."<sup>33</sup>

For the production of white we therefore need to find a way of adding the colours alone without their material skieron aspect. This cannot be achieved by making the colours as light as possible (a popular misunderstanding of the nature of additive colour mixing), for if we take three coloured lights, for instance, we find that:

"Now just as each of these three skieron is visible in each of the three colours, despite the light that is combined with it, so the whole cannot gain in brightness by three such skiera being united together with their three rays of light... Thus it is not the increased illumination, which is balanced by the increased shade or darkness, but the contrast of the colours that here produces the impression of pure light, or of white."<sup>34</sup>

So what happens according to Schopenhauer is that as each external cause of colour produces its complementary in our eyes, light colours produce dark effects so that their mixing - in order to yield white - is unsuccessful. If we, however, take truly complementary colours and ensure that they meet our eyes simultaneously without being themselves mixed, then one of the colours will produce its complementary in the eye, and the other colour the opposite complementary, so that in the end we get one whole, full activity of the retina, which is light, or white. Schopenhauer stresses again:

"This happens only when things are so arranged that both the external, exciting causes of the two complementary colours operate *simultaneously on the same spot* of the retina, without themselves being directly blended."<sup>35</sup>

What I find fascinating about Schopenhauer's account is that he does not rest with the standard experiments of coloured shadows on white paper produced by several coloured light sources (or in his case light shining through various parts of prisms), but goes on to investigate more unusual cases. It is particularly interesting in the context of

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<sup>33</sup> "Zunächst kann es nicht dadurch geschehn, daß man zwei chemische Farben zusammenmischt: denn diese wirken alsdann zwar im Verein, aber nicht gesondert." (ibid)

<sup>34</sup> "Wie nun jedes dieser drei skiera für sich, des mit ihm verbundenen Lichtes ungeachtet, doch in jeder einzelnen der drei Farben sichtbar ist, so kann dadurch, daß drei solche skiera mitsamt ihren drei Lichtern vereinigt werden, das Ganze nicht an Helle gewinnen... Nicht die vermehrte Erleuchtung also, die durch das vermehrte Dunkel aufgehoben wird, sondern der Gegensatz der Farben ist es, der hier den Eindruck des reinen Lichts oder des Weißen herstellt." (S&F, p.245; Payne, p.43)

<sup>35</sup> "...; sobald man es nur anzustellen weiß, daß die beiden äußern erregenden Ursachen zweier Ergänzungsfarben, ohne sich selbst direkt zu vermischen, *zugleich auf dieselbe Stelle* der Retina wirken." (S&F, p.248; Payne, p.45)

this chapter that Schopenhauer even succeeds in the mixture of chemical colours, provided that at least one of them is transparent or reflective. The examples Schopenhauer gives are: light falling through orange glass onto a blue mirror, a gold coin in a blue glass bowl, blue paper reflected by polished copper, a (presumably red) rose illuminated by light falling through green curtains, and overlapping reflections of red and green in a mirror. I tried out several of these experiments myself, and must agree with Schopenhauer that "In all these experiments, however, the two colours must be of equal energy and purity".<sup>36</sup> Thus in many of the experiments one colour will dominate over the other, and in my case the green light from the garden influenced the experiments too. Additionally, our eyes are spoilt by the bright colours around us, and some of the effects are weaker than one might expect. In principle, however, Schopenhauer has found a reliable rule of how to produce white.

Before I conclude on the mixing of white, I should like to briefly explain the role of reflection and transparency in Schopenhauer's experiments. As I argued above, transparency and reflection are neutral media of light. So the success of Schopenhauer's experiments can be explained by the standard explanation of additive colour mixture which uses two coloured light sources. As each of the light sources can be regarded as a white light source with a colour filter in front of it, so too can a coloured transparent or reflected medium be regarded as a light source with a colour filter. This is further illuminated by Schopenhauer's last example of the production of "white glass": In Schopenhauer's times as today, glass was naturally slightly green due to its containing iron. For the production of colourless clear ("white") glass, some reddish brown material has to be added. Although one might say that due to their transparent nature each of the coloured glass so to say contains a light source within itself so that they are like one reddish brown and one green filter each with a light source behind them shining onto the same patch of white paper, I must admit that this does not convince me as the glass *does* seem to be a mixture of the two colours, so that they do not act separately on our retina. Nevertheless I think that Schopenhauer has successfully proven the production of white from other colours to be possible.

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<sup>36</sup> "Bei allen diesen Versuchen müssen jedoch die beiden Farben von gleicher Energie und gleicher Reinheit sein." (S&F, p.247; Payne, p.45)

While it may seem puzzling that Schopenhauer remains in opposition to Newton although both proved that white could be produced from other colours, this puzzle is resolved when one remembers that for Newton the mixture is objective and for Schopenhauer it is subjective. Thus Schopenhauer can remain true to his belief that light is pure and indivisible, because for him all colours (including white) are effects on our eyes/brains, and hence their mixing takes place in our heads. This means that the nature of light itself is not affected by any mixture and nor is anything proven about the nature of light by showing that we as human beings represent certain combinations of coloured objects and lights as white. Schopenhauer can therefore continue to argue that Newton was mistaken in thinking he had proved light or white itself to consist of colours.

#### 4.5. Conclusion

What remains is a mere clarification of concepts, for which I shall have another look at my original premisses:

1. "White is by definition the lightest colour."

I trust this to be undeniably true.

2. "Any colour other than white contains some dark quality (skieron)."

This premiss needs to be extended: Any colour includes dark and light qualities, as well as the hue particular to that colour. Only if we include hue, can we reach Schopenhauer's solution involving not only lightness complementaries but also hue complementaries.<sup>37</sup>

3. "The mixture of colours is the addition of their qualities."

This premiss can be accepted as it is. The result of the colour mixture depends on the kind of addition used: thus two colours can be added simultaneously or successively, and they can meet different parts or the same part of the retina. Only the simultaneous mixture on the retina of two as such separate colours yields white, as only this kind of addition produces complementray colours simultaneously. Other kinds of colour mixture have a weakening effect on the saturation of the original colour in the mixture, and thus bring out only their material participation in light and dark which, after several additional mixtures, naturally averages into a grey.

4. "Hence any mixture containing a colour with dark qualities contains some element of darkness and is therefore not white."

This, as we have seen does not follow, and I must stress once more why the conclusion does not follow: If we distinguish between cause and effect then any quality of a cause is not necessarily also a quality of its effect, even if we assume that it has some effect. In this case, the relative darkness of the colour does matter, but only in so far as its complementary colour must not only be complementary in hue but also in brightness and lightness. Perhaps this is best illustrated by using the image of weighing scales: If

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<sup>37</sup> Schopenhauer's own theory does not require the consideration of hue, as it rests on lightness alone. But this explanation is neither sufficient as an explanation of colour (see ch.III, sect.2.1) nor with regard to the mixing of white. Schopenhauer's own examples show that he would not mix blue (1/3) with greenish-yellow (2/3), or orange (2/3) with redish-purple (1/3), but that he only considers genuine complementaries.

there are two equal weights of, for instance, one pound on each side of the scales then the total weight of the scales has increased by two pounds (resulting in the heavy material effect that Goethe and Wittgenstein concentrate on). Yet the scales are in balance, and in a sense, show no weight at all (they yield Schopenhauer's white).

The arguments about the mixing of white show that we need to be careful when we use phrases such as "the colour contains dark elements". This phrase is misleading unless one explains whether the kind of containment referred to is material (yielding a grey two pounds) or is conceptual, leaving the possibility of white equilibrium or grey mass, depending on the equivalent concept of whiteness.

A second conclusion I draw from this chapter is that the possibility of mixing white from two as obviously non white objects as a blue glass and a gold coin, is very much like the production of a transparent surface with three pieces of coloured card board: In both cases, provided the conditions are carefully obeyed, an ideal can be produced by something obviously material.

## **5. Opacity and Reflection, Black and Grey**

### 5.1. Reflection

#### a) Ideal reflection

Reflection as the ideal opposite of transparency can be explained in the following way: When I look at an object through a clear pane of glass I see the object right in front of me. But if I swap the clear glass for a mirror I can no longer see the object but instead see myself. I thus become an object of my own vision. Thus reflection changes the object into a subject: I can see myself being looked at by myself, and the peculiarity of looking into a mirror might stem from the fact that I cannot move the limbs of the mirror image as well as I can move my own, so that the image in the mirror is like me and not like me at the same time. It is I, both as subject and as object.

As I explained in my chapter on light, Hegel uses this relation of reflection as a special form of identity. Light is the unity of reflection-in-itself, and hence reflections of light can also be subjects of light: when a light is reflected in a mirror it makes the mirror into a light source itself. Hence the blinding effects a reflective surface can have: snow and water reflect the sun so strongly that people need to wear sun glasses, and our own car mirrors can blind us if the car behind us has strong and ill adjusted lights. Thus without further information it is impossible to distinguish a mirror from a true light source.

With the exception of light (which is unity itself) unity between subject and object cannot be achieved in reflection; but just as light propagates itself in reflection (Enc.§276), so do images (we all know the fascinating effect of infinite reflections in two or more mirrors). Ideally at least, when the mirror is perfectly clear, this propagation does not effect the quality of the colours but only spatial relations and in particular the sizes of images.<sup>38</sup>

#### b) Empirical Reflection

Empirically, reflection is a matter of degree. Thus there are the clear reflections of polished mirrors, the weaker reflections of non-polished or even blind mirrors, metals and at last non-reflective matt surfaces. One might argue that there are states of glossiness or shininess between perfect reflection and non-reflection, yet similarly to the case of translucency as a state between transparency and opacity, I do not find these concepts very helpful. We do of course use them in our language, but it is the ideal concepts that carry the weight. If you had to explain the word "glossy" to a foreigner, you would probably say that something glossy was something slightly reflective. (Note how glossy paint often seems to have a shiny transparent layer on the surface). The other way round, however, you would hardly use the word "glossy" to explain reflection, but might instead give spatial explanations.

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<sup>38</sup> Note also that many magicians use mirrors for spatial illusions.

### c) Perceptual and Physical Reflection

As in the case of transparency, reflection too can be perceived without there being a physically reflective object. A physically reflective object can be defined (albeit it in a rather circular fashion) as an object that by its surface structure reflects most of the light incident upon it in a directional reflection (as opposed to the diffuse reflection of white objects). The chemical-physical surface structure is however not sufficient to enable us to see reflections. More important is the viewing angle at which we look at the surface. This is most obvious in the case of windows and other transparent media which are only reflective at certain angles. This is so because in directional reflection the viewing angle is the same as the reflection angle. Thus the reflective surface may be reflective to another viewer (who might even see my reflection in the glass as I desperately try to catch it myself), but not to myself and vice versa.

The second condition for a surface to be reflective is that some light must shine on it. This is not just for the obvious reason that we would not see it in utter darkness but because reflection as such requires light. We might go as far as to say that it produces light by reflection. Thus especially on a dark surface we will see the light reflections such as my gold rimmed spectacles and my blond hair easily, while my wine jumper looks rather dull.

As in the case of transparency, physical reflection is not a necessary condition for the seeing of reflection. Not only are there perfectly non-reflective (dull) patches of paint that represent reflections in paintings but even a black and white drawing can give the illusion of a reflection. This is so because reflection like transparency is essentially a spatial concept. That reflectance is primarily a spatial concept can also be seen in the difference between correct and incorrect representations of reflections in paintings. Artists can use our knowledge of the rules of reflection to deliberately show us a different reflection than the naturally correct one (such as in Vermeer's *The Music Lesson*).

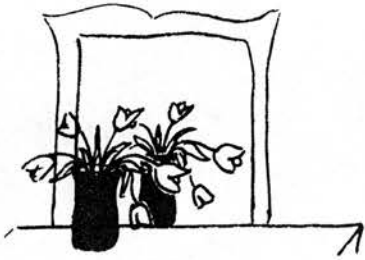
## Reflections

1. The reflection of light points to the location of the lightsource:

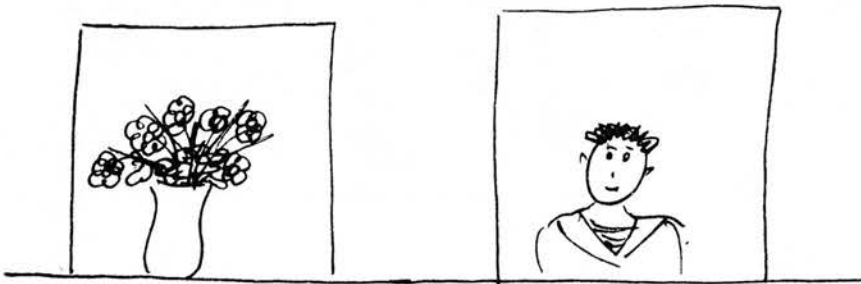


2. Mirror reflections

a) Mirror reflections need not be perfect to be convincing:



b) But representations of mirror reflections must include at least part of the original object of reflection to avoid confusion with a window. Here we again see that reflectance and transparency are opposites: in the drawing of the girl above we can see her as either looking at herself in a mirror or as looking at someone else outside her window, but not as both.



## 5.2. Opacity

In contrast to transparency and reflection there is no such thing as ideal opacity. Opacity is a very earthy and dull thing, very much like clay. It carries none of the clarity and beauty of reflection or transparency and it seems more like a foundation than like something to aspire to. As I said above, opacity is essentially a surface concept. While there can be opaque clouds and wafts of smoke or fog these are transparent when looked at (or rather, looked through) close by. Like transparency, opacity can take on any colour, but unlike transparency this will not make the opaque medium any less opaque. Opacity is thus the third and probably most common form of neutrality, both in the sense of occurring most frequently, and in the sense of "base".

Boringly therefore, opacity is everything that the others are not: it introduces earthly turbidity into divine clarity by being a physical property of objects which we cannot clearly see through and which are not (necessarily) reflective. Thus it is whatever is left once transparency and reflection are removed: non-polished glass for instance is neither reflective nor transparent but opaque. Opacity is in this sense the material that is left over when we look at the examples I gave of dull opaque surfaces which looked brightly reflective or subtly transparent in certain conditions. Opacity is also very much like the oyster grey left over once colours have lost their lightness in a mixture.

As the material basis for everything visible, the only way opacity can gain beauty is by being beautifully coloured or representing something beautifully coloured. In fact there is no non-coloured surface, of course, but the point is that just like a transparent space, an opaque surface can take on any colour. Depending on the intrinsic lightness of the colour applied to it any opaque surface will become lighter or darker than it was before, a process most frequently observed when an object is being painted.

### 5.3. Black and Grey

#### a) The Polarity between black and white

Black as the opposite to white represents darkness. It too is ideal in the sense that we will never see the ideal, the deepest black.<sup>39</sup> Where white reflects light, black is said to "swallow" light. This points to an important phenomenological difference between the two colours: while whiteness is more like a surface, blackness appears as depth. This phenomenon is most obviously observed when looking at fog at night. Fog at night appears as the deepest blackness, so thick that you seem to be able to hold some of it in your hand (think of all the marvellous descriptions in Dickens's novels), but as soon as you shine a light at it, it is suddenly very close, and more like a wall than like volume.

#### b) Grey between Black and White

Grey plays the sad role between black and white that opacity plays between transparency and reflection: All empirical whites and blacks are more or less grey, just as all empirical transparencies and reflections have some degree of opacity. Also, of any two shades of grey, given the right conditions of contrast, one may look clearly white, the other clearly black. A relatively light grey looks black on television, for instance. When one looks at a switched-off television set its screen is light grey. But because the television picture consists of lights the representation of black in films is mere absence of light: the same areas that looked grey when the set was switched off appear the darkest black when it is switched on. On the other hand, a shade of grey can also look white when seen in the context of lots of darker greys (see illustrations next page).

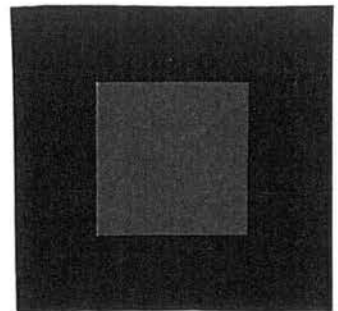
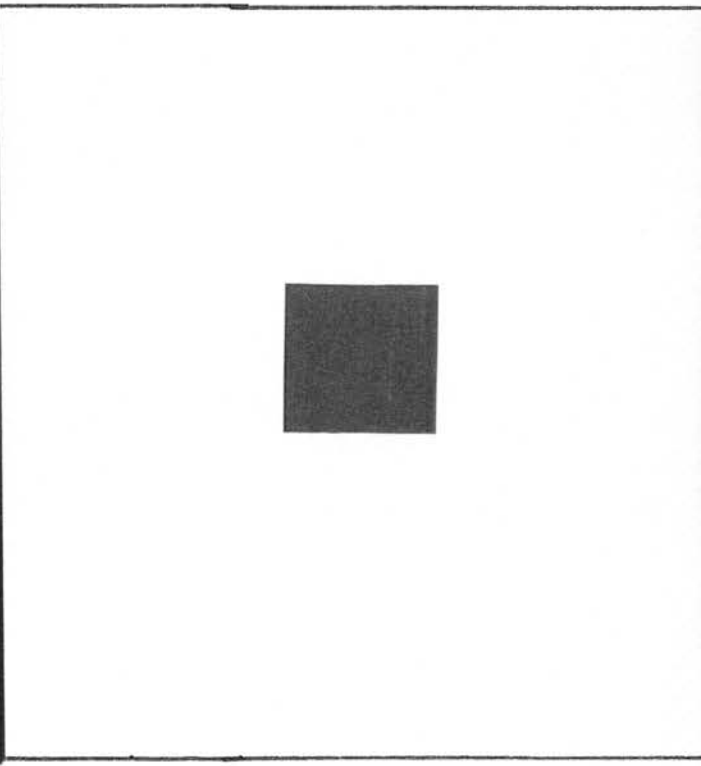
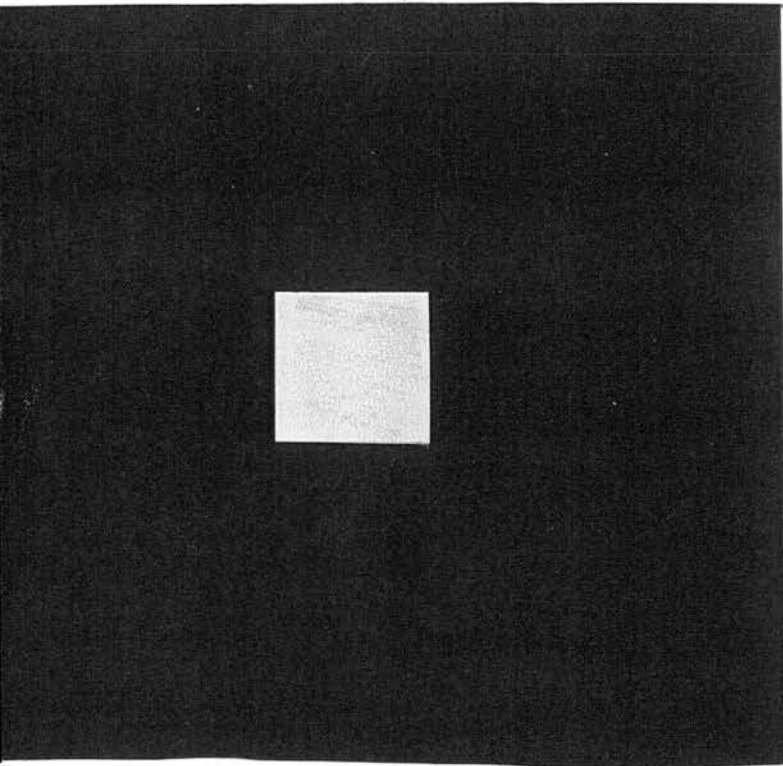
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<sup>39</sup> Whichever sample of black one looks at it will always look bluish, greyish or brownish beside another shade of black.

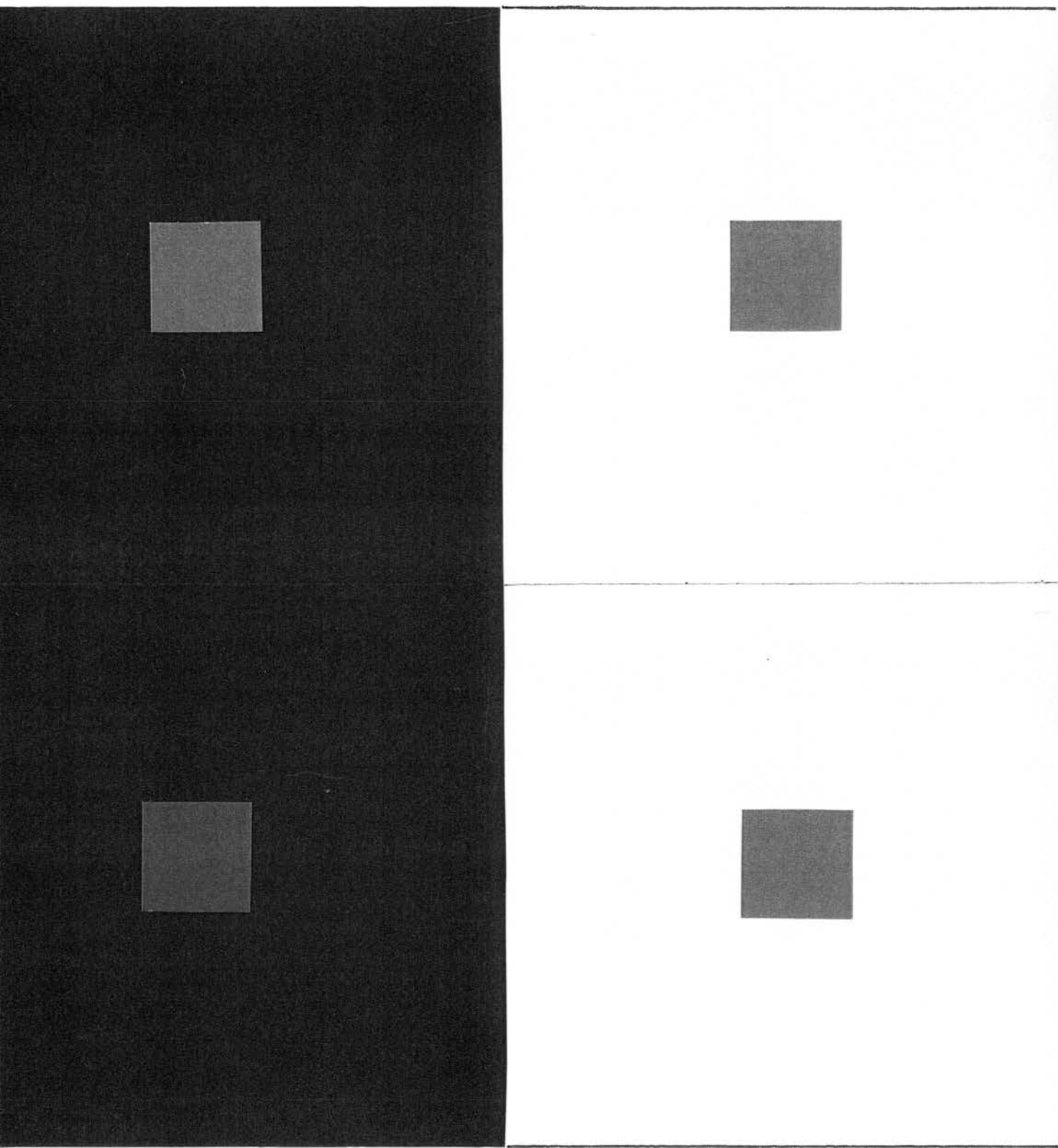
1. The monochrome scale



2. If you cover this page with the exception of the left square below you will see a white square on a black square; similarly the right example looks like a black square on a white square.



3. This effect which surrounding lightness has on the lightness seen can also be demonstrated by showing two equal grey squares once on a white and once on a black square, or two unequal grey shades on the same backgrounds which then look the same shade of grey. (Again, please look at each of these examples separately.)



## 6. Conclusion: Four Forms of Neutrality

In this chapter I hope to have shown that transparency and reflection are ideally neutral, while opacity and the grey shades are empirically neutral. Let me just summarise these relations once more:

Transparency and reflectance are ideal opposites. Their empirical representations such as crystals and mirrors always carry a degree of turbidity. As strongest turbidity is opacity, opacity is the empirical opposite of both transparency and of reflectance.

White and black are also ideal opposites, which are approximated by white and black colour pigments. Empirically there is an infinite number of grey shades between black and white. That there is no empirically perfect black, white or grey can be seen in the fact that direct comparisons between shades of black, grey and white respectively, make some of them look bluish and others yellowish (reddish and greenish tints occur more seldom).

All of these concepts are neutral in the sense that they can take on any colour: there are coloured transparent media, colour reflections and opaque colours which can be painted on white, grey and black foundations. By definition, colours darken white and lighten up black, but they can do either to grey depending on the relative lightness of the grey shade.

If we conceive of light as a perfect unit we might say that

1. Ideally,

- it travels unchanged through a transparent medium;
- it is reflected unchanged in a reflective medium;
- it is brought to a halt by an opaque surface.

Hence, ideally neutral media do not change the quality but only the quantity and direction of light.

## 2. Empirically,

- both transparent and reflective media are at least slightly turbid/opaque, so that some of

the light is stopped on its way (the resulting less perfect states are "translucent" or "glossy").

- white and black are the material representations of light and darkness; were they perfectly pure they would not change the quality but only the quantity of light reflected

from or transmitted through black or white substances.

- as there are neither pure transparency and reflectance, nor pure black, grey or white, everything that we see is more or less coloured.

Hence, empirically every medium changes not only the quantity and direction but also the quality (colour) of light.

## VIII

### PRIMARY COLOURS AND COLOUR SPACES

In his exhibition catalogue *IdeeFarbe* Narciso Silvestrini lists 72 colour systems ranging from various Ancient Greek and medieval European systems via Forsius' colour sphere (1611) to Silvestrini's own "CMN-system" (1986). The last twelve systems are "metasystems" which range from astrology and anthroposophy to several world religions.

In this chapter I shall describe the development of different colour systems which can all claim to represent the relations of colours to each other and which, despite their disparities, seldom contradict one another. In order to do this I shall first explain the different uses of the term "primary colour". As we shall see most systems rest on three or four relatively obvious primary colours, but some systems of five or more colours include among their primaries colours such as "metal" or "sandalwood".<sup>1</sup>

Irrespective of their notion of primary colour, all of these systems are essentially based on geometrical relations. Unlike Schopenhauer's arithmetic analysis of colour, they thus rely on two or more dimensions. That we indeed require three criteria (hue, lightness and brightness) for the identity of each colour, and that these can best be represented in two- or three-dimensional models, will, I hope, become self-evident by the end of this chapter. For once we have understood the various notions of "primary colour" we shall see why black and white add an extra dimension to each system. I mean this quite literally, as the black-white axis makes a circle into a sphere, a cone or a cylinder, a triangle into a pyramid, and so on. From the number of primary colours and the shape of the colour space we shall be able to deduce the function of each colour space, or rather, the application of the representation to practical matters. As we shall see there is a fundamental difference between ideal (or prescriptive) and functional (or descriptive) colour spaces.

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<sup>1</sup> Linked to the understanding of all these systems is the linguistic problem of how we can know which colour is denoted by which colour term. I shall return to this problem in chapter IX.

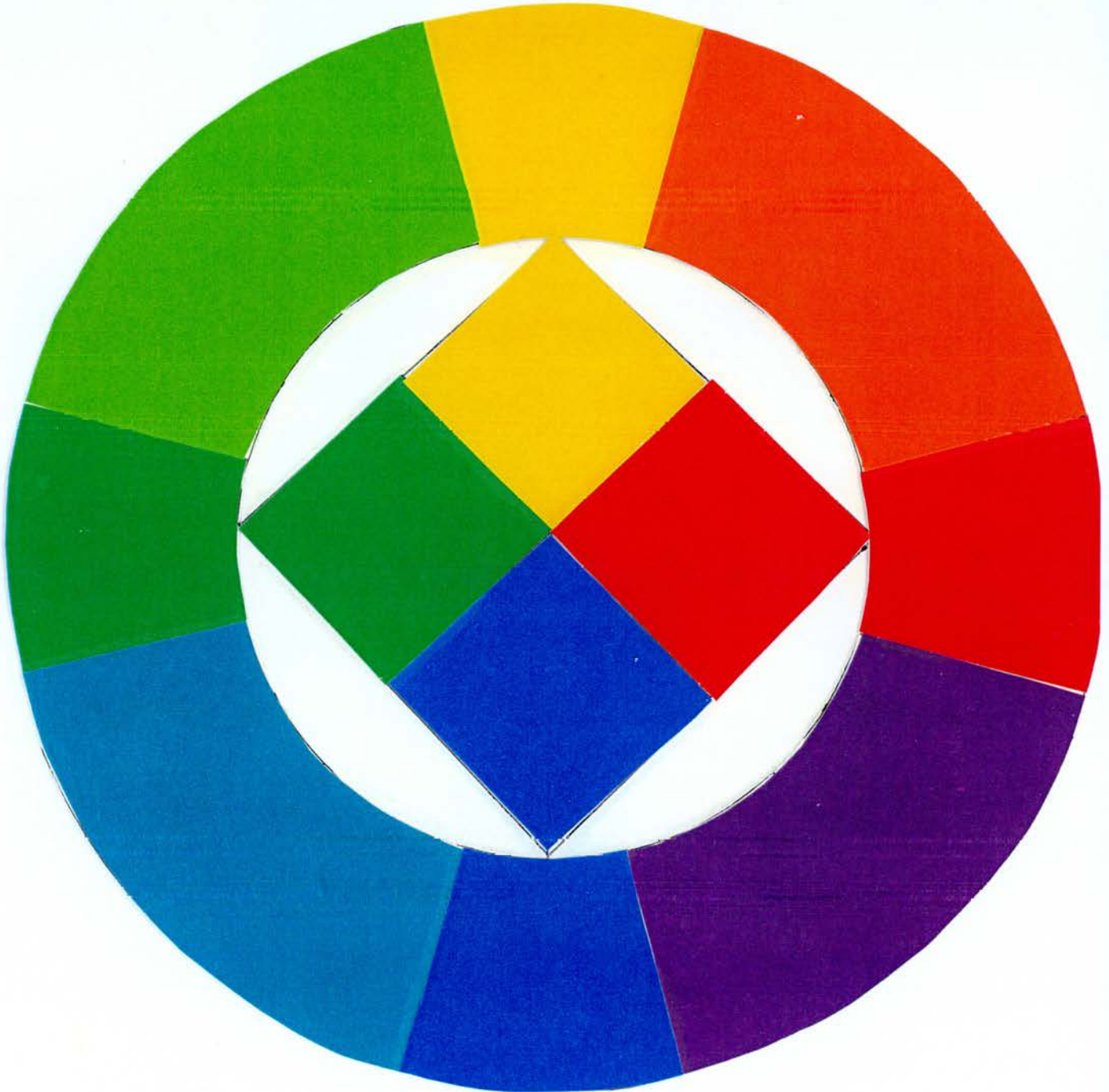
## Circle I: The Artists' Circle

The "artists' circle" is the colour system most frequently used by artists and other followers of Goethe. Albers, Itten and Steiner use this circle, and Itten bases his colour triangle on the relations in this circle (see ch.X, sect.2). Its essential features are the three primary colours red, yellow and blue in equal distance from each other and with their complementaries (green, purple and orange) at the opposite sides of the circle.



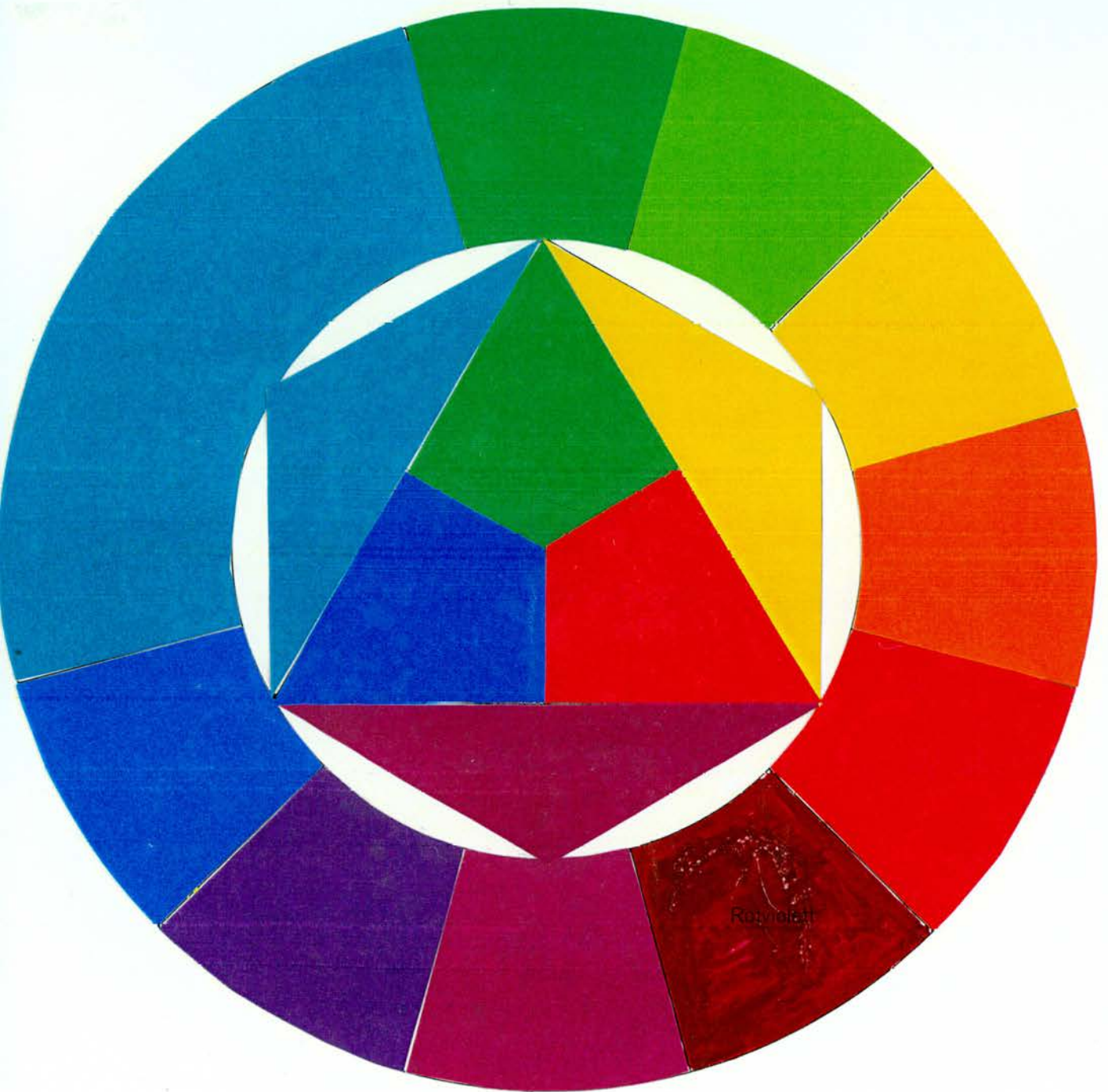
## Circle II: The Logical Circle

The "logical colour circle" shows the logical relations between our (Western European) colour concepts. In contrast to the first colour circle we have four primaries (red, yellow, blue and green) which are equidistant to each other. Goethe actually used both circles interchangeably, but it is Wittgenstein who defends the four primary colours most strongly.



### Circle III: The Physical Circle

Strictly speaking this is the circle for additive colour mixture, while circle I illustrates subtractive colour mixture. The colours in this representation are far from perfect; they should consist of the following opponent pairs: red and cyan, blue and yellow, green and magenta. We thus arrive at the three primaries red, blue and green.



## 1. Primary Colours

There are two essentially different uses of the term "primary colour", a confusion of which often leads to misunderstandings or even gross mistakes. So called "generative" primary colours are the smallest number of colours needed to mix all other colours, while "fundamental" primary colours appear as fundamentally simple and in necessary relations with other colours. Philosophically speaking, fundamental primary colours are the colours referred to in atemporal propositions about internal colour relations, whereas generative primary colours are used in temporal propositions about external relations. It is therefore impossible to map or reduce one kind of proposition to the other (see also Westphal (1987), p.93).

### 1.1. Generative Primary Colours

Generative primary colours are the minimum of colours needed to produce all other colours. There are two different mixing processes and hence two sets of generative primary colours.

#### a) Additive Mixture

In additive colour mixtures the eye receives every colour separately but simultaneously so that it receives the sum of all light waves emitted or reflected from each colour. Unless we require an exceptional degree of precision, we can use Schopenhauer's instructions for additive colour mixture: Under circumstances in which we see two or more colours simultaneously, which physically remain separated from each other (such as when two coloured lights are shone onto the same spot of a white screen), any two equally strong complementary colours can be used to produce white; an uneven mixture of them will produce most other colours; and three colours in varying proportions additively mix to yield every single colour (even though the dark colours, in particular brown, are best mixed by subtractive colour mixture - see below).

The ideal three primary colours for additive mixture are those three colours to which the three kinds of photosensitive chemicals in our eyes react. This is one short wave, one medium wave and one long wave colour (often simplified as blue, green and red). Yet the colour matches resulting from their mixtures vary slightly from one person to the other, so that slightly different colours are primary in different people, and colour deficient people only require two colours for each match (they thus lose some degree of precision). One could take these individual divergences as evidence for a subjectivist account of colour, but James Clerck Maxwell found that for everyone any two colours are sufficient to mix most other colours (some fine nuances excluded), and that any three colours can be mixed to produce any other colour at all (provided that none of the three can be produced by a mixture of the other two). Given some relatively simple wavelenghts measurements we can therefore use Maxwell's formula to produce any colour we like, so that there is an objective way of producing all colours; the only subjective aspect to additive colour mixture is the way individuals match the mixtures with other colour samples, and as I argued in ch.II,3.3. the matching of colours rests on the assumption of objective criteria of sameness.

Because in additive colour mixtures the colours have to appear simultaneously but unmixed, pointillism is a form of additive colour mixture. This means that a yellow dot beside a blue dot will not look green (as often thought) but will appear a very light grey. Wherever a white foundation is visible it too will mix additively, and the general mixing of the light rather than the dark colour properties explains why pointillist paintings are generally quite bright even though they are made up of relatively dull dots. The darkest parts of the pictures usually show less difference in colours than the brighter parts do, and they are often almost uniformly painted compared to the highly varied dots in the brighter areas.

## b) Subtractive Colour Mixture

The standard example of subtractive colour mixture is the mixing of colour pigments. Instead of pointillist paintings we can now think of the many portraits and landscape paintings in which the brightest areas are often pure primary colours or mixtures with white or yellow; all other mixtures in these paintings are usually rather dark. (Think especially of paintings by Rembrandt and Caravaggio who both use primary colours for bright highlights in otherwise dark paintings).

The colours are mixed from substances which have already absorbed the light, so that each colour which is added to another colour or colour-mixture of more or less equal lightness will darken it. Only the addition of a substantially lighter colour such as yellow or white will lighten the mixture as a whole. Thus a mixture of equal proportions of yellow and blue will yield a deep pine green, and only if we use considerably more yellow than blue in the mixture will we get a light green.

Most artists still use yellow, red and blue as generative primary colours for the mixing of pigments, but in colour prints red and blue have been replaced by "magenta" and "cyan". Cyan and yellow mix to green, yellow and magenta to red, and magenta and cyan to blue. We thus find that the standard primary colours of additive colour mixture are the complementary colours of subtractive colour mixture.

## c) The Combination of Additive and Subtractive Colour Mixture

The two sets of ideal<sup>2</sup> generative primaries for additive and subtractive mixture as each other's complementaries have been represented in one cubic colour space by William Benson in 1868.<sup>3</sup> Both kinds of mixture define pairs of complementaries as those colours which yield achromatic white (and grey respectively) when mixed in equal proportions. This is an important conceptual difference from the fundamental primary

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<sup>2</sup> These are the ideal primary colours because they appear as simple colours (see fundamental primaries below). As Maxwell has shown, any combination of colours can be used provided they are not complementary to each other.

<sup>3</sup> Although Benson's cube is almost too perfect to be neglected, it is also too complex to be included in this thesis.

colours whose complementary pairs are defined as those colours which simply cannot be mixed at all (we would not know what it meant to mix them).

Besides the ideal relation between additive and subtractive colour mixture we find the real combination of both in our everyday surroundings. Any surface which is not uniformly coloured partakes of additive colour mixture. Television pictures are the most common example of additive colour mixture (the dark parts of a film are non-lights), but the overall colour of natural substances such as wood, grass, hair, flowers, etc., also derives from additive colour mixture (they all look darker when looked at very close). Painted and dyed surfaces, on the other hand, as well as surfaces seen in coloured light or through transparencies in non-adaptive circumstances are forms of subtractive colour mixture.

Please have a look at the comparison of additive and subtractive colour mixture on the following page.

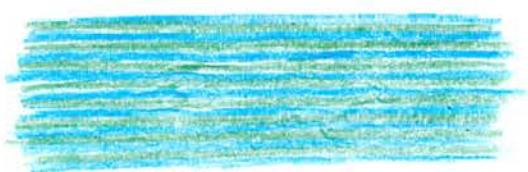
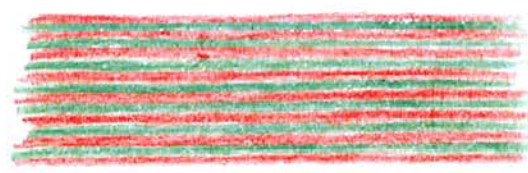
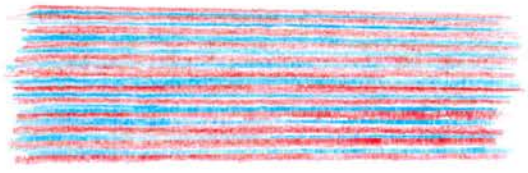
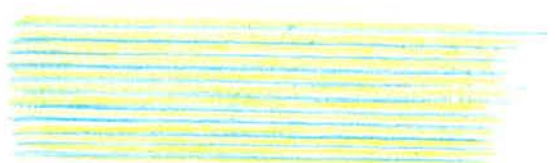
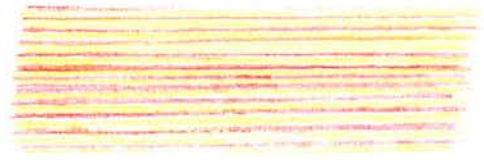
## Colour Mixing

The two sets of examples on this page are made up of the same colour pigments as each other, but the pictures on the left generally appear to be darker than the ones on the right.

### Subtractive Mixture



### Additive Mixture



## 1.2. Fundamental Primary Colours

Fundamental primary colours can be defined as those colours which are perceptually pure (even if they are physically mixed, which most colours are). Fundamental primaries thus include a strong subjective aspect which can best be illustrated by a comparison of the opinions of Paul Klee, who thinks that the idea of four primary colours "hurts",<sup>4</sup> and Wittgenstein, who thinks that green as an intermediary (rather than primary) between blue and yellow seems wrong, "even apart from any *experience*".<sup>5</sup>

In either case the fundamental primary is treated as a turning point within the colour spectrum, whereas secondary or intermediate colours are on a kind of path between the primary colours. If we thus look at the line



we find that yellow and red stick out as perceptually pure colours in an equally graded line. This is even more apparent when we look at the spectrum itself. We find it relatively easy to "remember" where pure red and blue are situated, but if someone pointed to a shade of light-green and asked us to find it again, we would have more difficulties.<sup>6</sup>

Geometrically, four primary colours form the more perfect colour space as we get the neat opposition of two colour pairs; but the three primaries of Klee's colour space demand each other and contribute to colour harmonies and disharmonies in an equally perfect manner which is important for the visual arts (see ch.X). As Wittgenstein points out, these are two different language games (RC.I,6). On the one hand green does appear more of a turning point than purple or orange are. But if I compare the first two colour circles at the beginning of this chapter, I find that the circle with the three primaries looks

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<sup>4</sup> See Arnheim, p.349.

<sup>5</sup> RC.III,26; also indirectly in I,9.

<sup>6</sup> See also Wittgenstein: "I may have impressed a certain grey-green upon my memory so that I can always correctly identify it without a sample. Pure red (blue, etc.) however, I can, so to say, always reconstruct. It is simply a red, that tends neither to one side nor the other, and I recognize it without a sample, as e.g. I do a right angle, by contrast with an arbitrary acute or obtuse angle." - "Ich mag mir ein bestimmtes Grau-Grün so einprägen, daß ich es ohne Muster immer richtig wiedererkenne. Das reine Rot (Blau etc.) aber kann ich mir sozusagen immer wieder konstruieren. Es ist eben ein Rot, welches weder auf die eine noch auf die andre Seite neigt, und ich erkenne es ohne ein Muster, ebenso leicht wie z.B. den rechten Winkel im Gegensatz zu einem beliebigen spitzen oder stumpfen." (RC III, 133)

compare the first two colour circles at the beginning of this chapter, I find that the circle with the three primaries looks more convincing than the one with four primaries whose green side looks unproportionally stretched compared to the red side.

The best solution seems to be to distinguish between the functions of the two circles: Wittgenstein's circle with the four primary colours is better at illustrating our colour concepts in which green is treated as a primary colour just as much as blue, red and yellow are. Aesthetically, however, the effect of red, blue and yellow is one of perfect complementation, in which added green disturbs rather than completes.<sup>7</sup> (Please have a look at the four possible combinations of three primary colours on the next page for confirmation.)

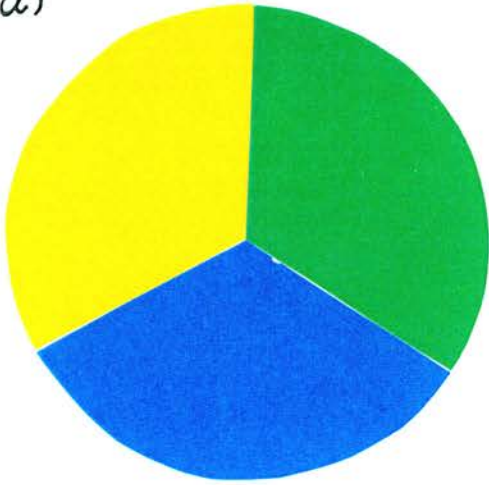
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<sup>7</sup> Do you remember the Regal cigarettes advertising posters (around 1990/91) which showed pictures of any number of objects none of which was blue or a mixture of blue, so that our eyes demanded the blue of the cigarette pack for aesthetically satisfactory completion? Green is not a primary colour in this sense.

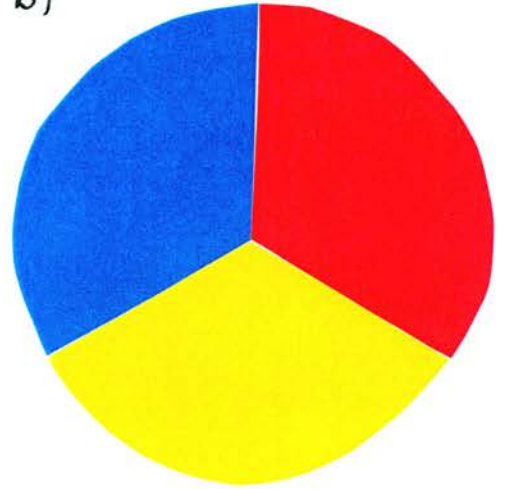
### Three Primaries

Looking at these circles, each of which consists of three of the four colours red, yellow, blue and green, one sees immediately which one is the most complete. I judge circle (b) to be the most complete and pleasing to the eye, while (a) is the least complete.

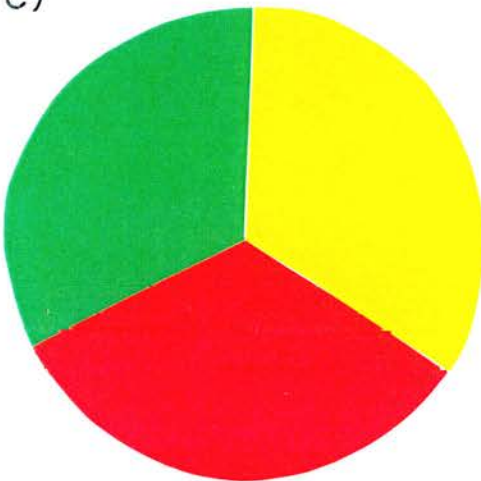
a)



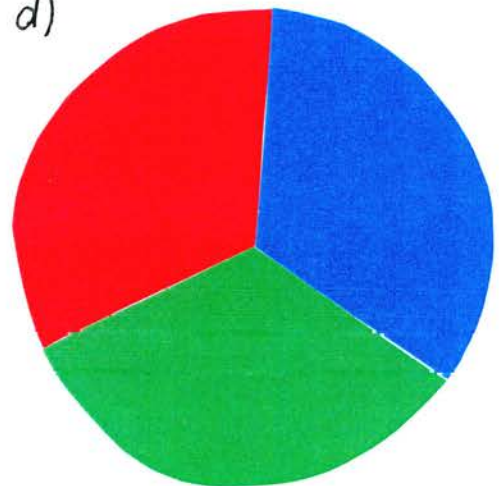
b)



c)



d)



e

### 1.3. Number of Primary Colours

Out of 70 of Silvestrini's systems which name their primary colours, 28 are based on three primary colours, 21 on four, six on five and five on six, seven on seven and three on larger numbers (36, 48 and 2-4-8 respectively). These statistics alone are, however, fairly ambiguous: The first problem we encounter is that black and white are included in some of the numbers but excluded (though presumably implied) in others. A second problem is that we do not always know which colour precisely is denoted by each colour term, nor in what sense the term "primary colour" applies.

It is most likely that the older systems do not use additive colour mixture; subtractively generative primaries and fundamental primaries, however, have often been confused, especially as many of the older colour terms refer to the natural sources of the pigments rather than to the resulting colours. Nevertheless I tried, on the basis of the already simplified data by Silvestrini, to count the individual primary colours used: 60 systems include the colour red, 58 blue, 51 yellow and 48 green. Next come black (ten) and white (nine), where explicitly stated. Cyan, orange and violet or purple (where given besides red) are each included four times, magenta three times, and metal/shine three times (once as metal/shine in general, once as silver and once as gold). One system includes peach, one sandalwood, and four do not name their primary colours.

As the most frequent combinations of primary colours are red and blue with either yellow or green or both, we may assume that these four colours are generally agreed on as primary in one sense or another, a conclusion which is supported by empirical evidence (Berlin and Kay, 1969). But we do not always know the criterion by which they are chosen, especially where they form parts of larger groups of primary colours.

## 2. Geometry of the Colour Space

Silvestrini's systems range from linear to multidimensional representations. Although three-dimensional systems are usually taken to be the best way of representing colour relations, linear and two-dimensional representations have their own advantages. Especially when a colour space is used to illustrate basic necessary relations, linear and two-dimensional representations can be grasped much more quickly than the complex multidimensional diagrams. Also, three or more dimensional systems can never be looked at completely at the same time, so that even a three-dimensional model can never show all the colour relations it intends to show (because one cannot see the surface and the interior of a three dimensional body at the same time).

Depending on the number of primary colours chosen, the representation will be based on a triangle or a square (with the circle leaving room for either three, four or more primaries). Historically we can observe a movement to more and more complex shapes and dimensions: The early systems are often linear (4 systems) or arced (2) or can be assumed to be linear because they are defined by their affinity to the musical scale (2). Next come the circles (15) and their three-dimensional counterparts (9 cones, 4 cylinders, 3 spheres), followed by eight triangles (and three pyramids) and a single cube. More complex shapes are the Munsell tree, a rhomboeder, an abstract "diagram" and four unnameable "space bodies".

## 2.1. The line from black to white

All linear accounts stretch from black to white and try to arrange the other colours between them. As we have already seen from Goethe we can easily call yellow the lightest colour and place it next to white, and then place blue beside black as the darkest colour; but we then have to decide between red and green as intermediate colours. To use both and place red beside green "looks wrong" unless one places a neutral (that is, neither red nor green, colour between them - see illustrations 1 and 2, next page).<sup>8</sup>

The first solution to this problem is to split the line into two arcs, one of which includes red and the other green (see illustration 3, next page). These arcs can easily be transformed into a circle. But in this case one would have to double yellow and blue which might seem odd (see following page).

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<sup>8</sup> Of the accounts which Silvestrini names none actually includes all four primary colours, so that the problem was avoided in the actual systems, but that does not mean that people did not worry about the problem of placing red and green within a linear representation of colour relations. During the middle ages green was apparently favoured over red. (Gage, 1995)

Problems with Linear Representations of Colour:  
How to Place Red and Green

1. First solution: Leave out either red or green.



a) black-blue-red-yellow-white



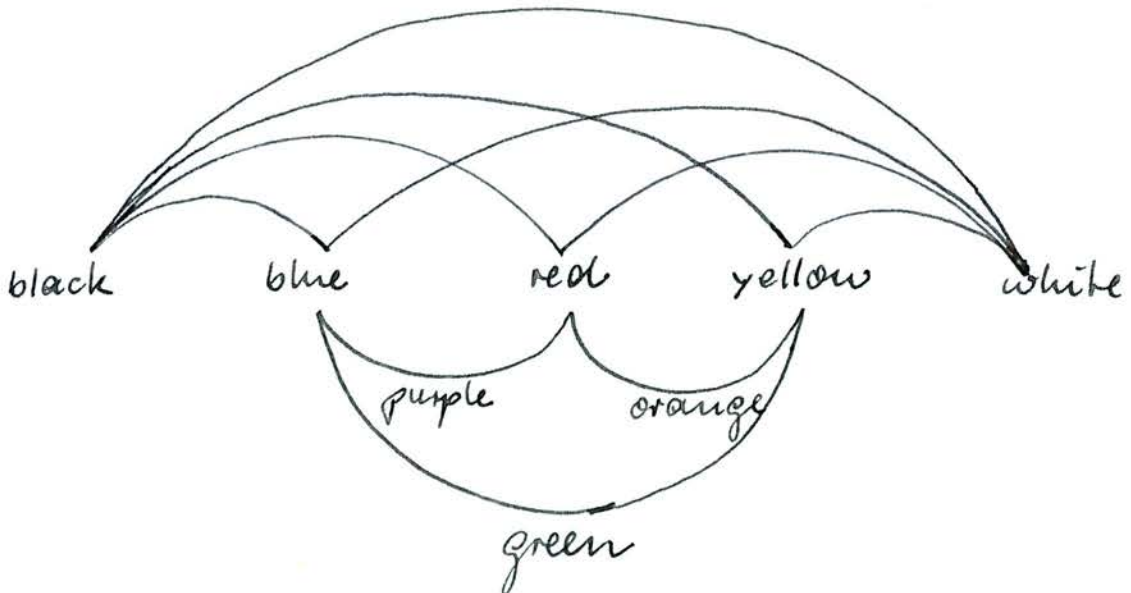
b) black-blue-green-yellow-white

2. Second solution: Insert a grey shade between red and green.



black - blue - green - grey - red - yellow - white

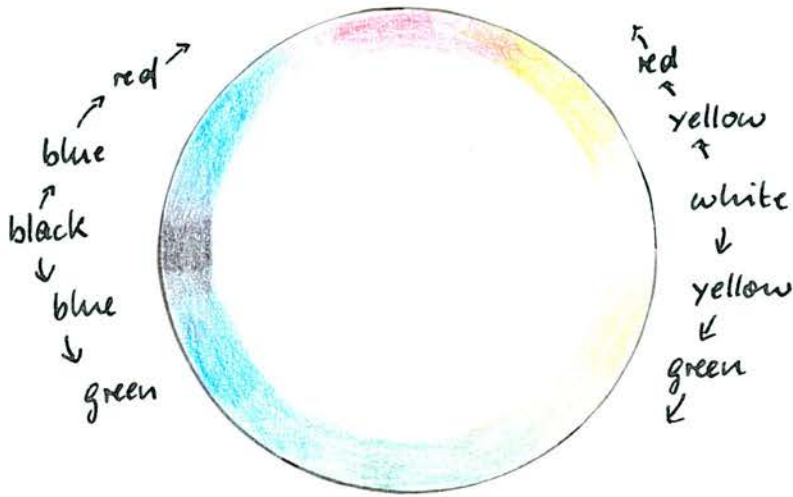
3. Third solution: Form two (or more) arcs.<sup>9</sup>



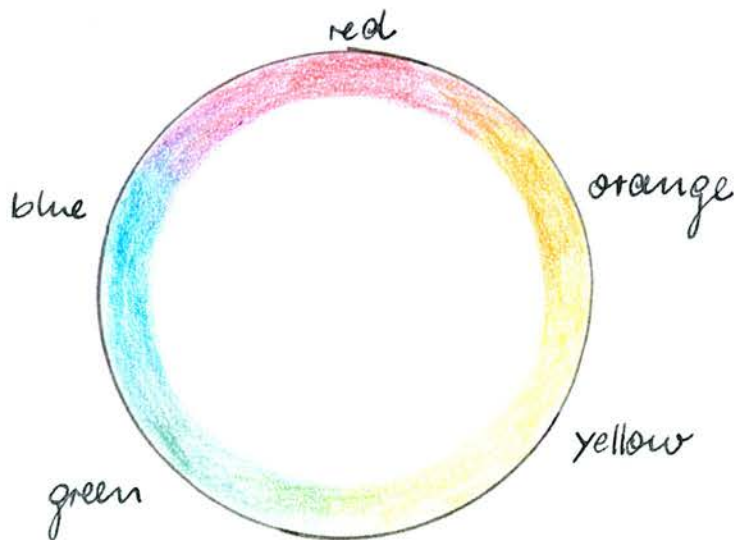
<sup>9</sup> after Franciscus Aguilonius (1613) in Silvestrini (1995, p.17);  
the original colour terms are: niger-caeruleus-rubeus-flavus-albus  
purpureus-aureus  
viridis

## From Arcs to Circles

1. The geometrical transformation: Combining the black-blue and yellow-white ends of the two lines or arcs above yields a colour circle which includes white and black as well as two transformations via yellow and blue respectively:



2. The pure hue circle: The doubling up of yellow and blue can only be avoided at the cost of excluding black and white (please note that this is not the case if one chooses the double arc; see below 2.7). In order to show that the colour circle can infinitely vary in its proportions this one illustrates a case of five primary colours (red, orange, yellow, green and blue).



## 2.2. Pure hues as the second dimension

A good way out of this dilemma is to exclude black and white to yield a pure hue circle (see illustration previous page). The line from black to white can then be added as a further dimension, with black and white themselves emerging as the poles of a sphere, the tips of a double cone or a pyramid, etc.

The pure hue circle, whether on its own or as equator around the colour sphere, can have three, four or more primary colours. We can even have a colour circle which represents the linear colour relations (i.e. which colour is next to which other colour) but which excludes notions such as primary and complementary colours by excluding any obvious counter-positions of colours.

Complementary colours, equal space for the primaries, and other geometrical notions are more clearly represented in angular shapes, most of which are based on triangles or squares. Here the primary colours are the corner points and are thus given greater priority (see also Albers's conversion of Goethe's colour circle into a triangle, ch.X sect.3). In a triangle three incompatible primaries form the corners, and their complementary colours are at the opposite sides of the triangle. The triangle therefore has the advantage of not only naming the primary colours but of also placing the secondary colours, a mixture of two primary colours, opposite the third primary. Complementary colours are thus complementary in two senses: as primary versus secondary, and as one colour visually "demanding" the other. The triangle can accommodate both this visual demand ("fundamental complementaries") and the "generative complementaries" of subtractive colour mixture in one illustration.

## 2.3. Saturation - the third dimension

In the space between the black and white axis and the pure hue circumference different grades of saturation obtain. A colour is saturated if it includes neither white nor black (nor, obviously, grey). Saturation is thus part of the internal colour relations. What this means is that unlike properties such as transparency or reflection, saturation (and also lightness) is a property of the colours independently of the object they are colours of

and fairly independently of context.<sup>10</sup> Thus I can categorically affirm that yellow is more saturated than brown, but it would not make sense to say that a yellow object was more saturated than a brown object (see also Westphal, 1987, p.93).

In colour spheres, the "equator" is occupied by pure hues which become less saturated the further they get to one of the poles (black and white) or to the centre (grey). Pyramids are similarly organised as double pyramids with black and white tips and a grey centre, around which the pure hues form the longest triangular (or square) circumference. (see diagram next page). What is illustrated here are the three standard internal relations of the colour space: Lightness, hue and saturation.<sup>11</sup>

#### 2.4. Gradation

That all of these shapes are ideal and prescriptive rather than descriptive of our typical colour experiences can be seen if we look at the transitional steps between the individual colours: some steps are hardly noticeable while others are relatively strong contrasts (look for instance at the contrast between yellow and yellow-green compared to that between yellow and light orange in circle I).

This shows that although our fundamental primary colour concepts are in agreement with our colour perception, there are subtle variations in their quantitative relationship to intermediary colours. This problem is not a conceptual but a physical one: we know what it means to have four equidistant primary colours with equal transitional stages between them in one geometrical body, but this does not mean that it is physically possible to construct this body. Things get physically muddled through the relations of colour with their physical bearers (colour pigments) on the one hand and their relation to perceivers on the other.

There are, however, several ways of retaining the symmetry of a system and also insisting on equal phenomenal grades between all colours: Ostwald, for instance,

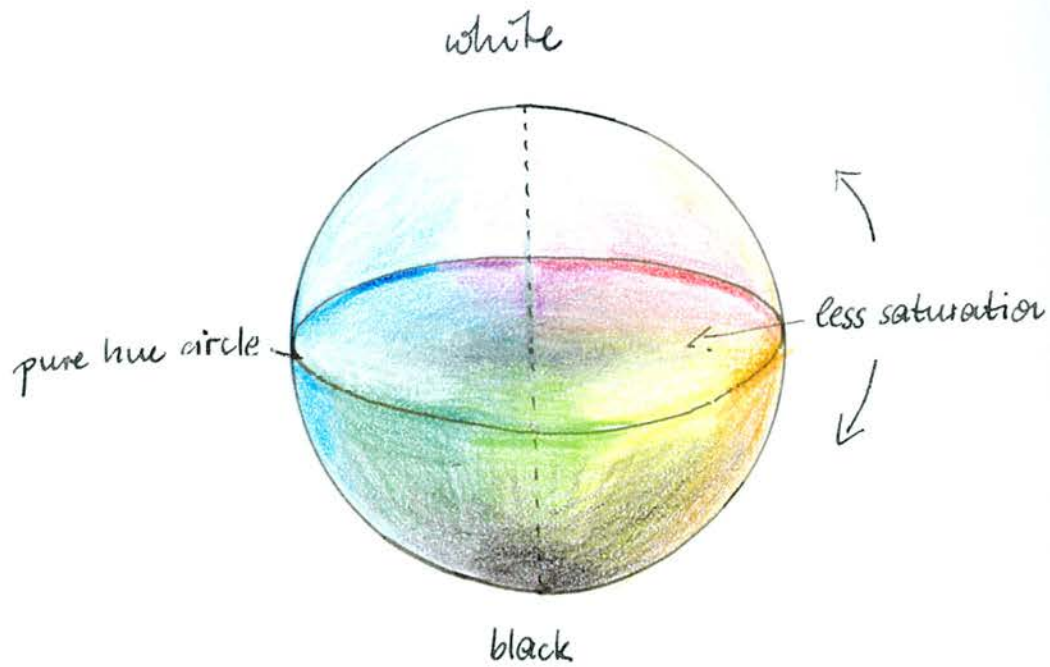
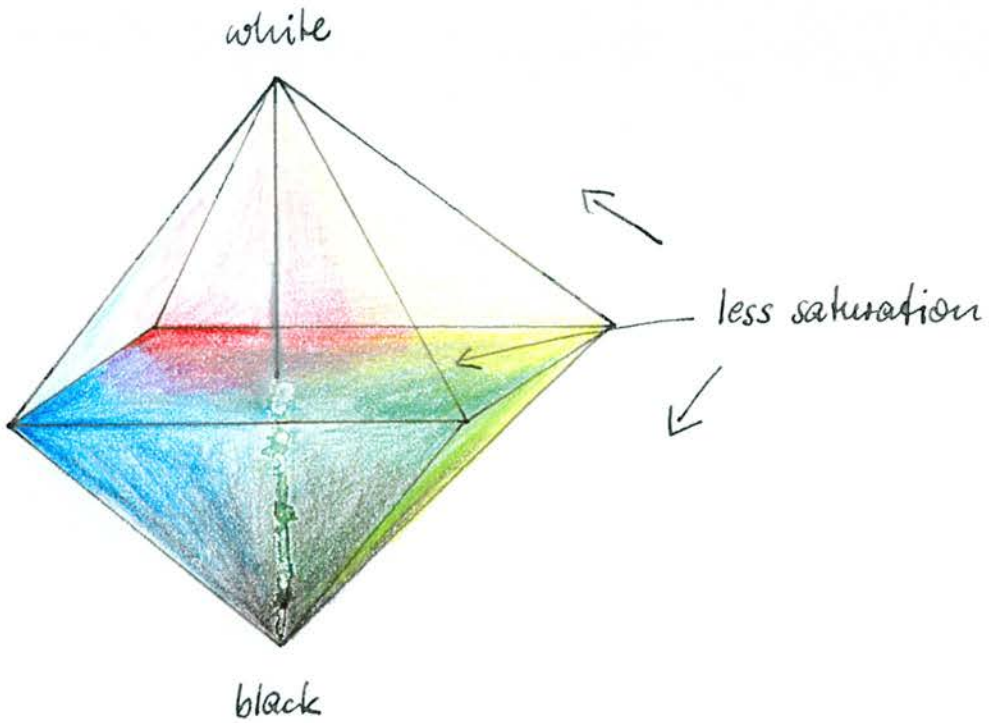
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<sup>10</sup> A fairly saturated green will look more saturated on a grey background than on a fully saturated green background, but this context is one of degree and not as essential as in the cases of transparency and reflection for instance.

<sup>11</sup> See next page for two examples of three-dimensional colour spaces.

## Three-Dimensional Colour Spaces

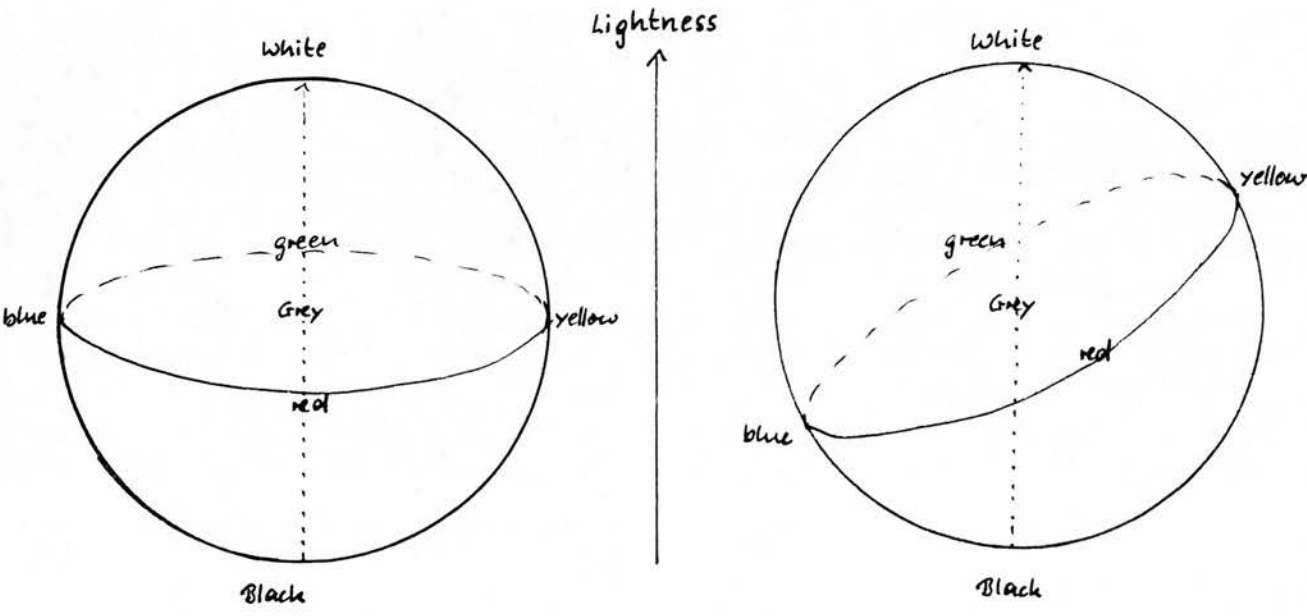
These are two examples of three-dimensional colour spaces, one based on a square (alternatively based on a blue-red-yellow triangle) and one based on any of the familiar colour circles (in this case more or less "logical" circle II).



adds some half shades to his hue circle, which protrude slightly from his 24 pure hues of the "equator". Munsell goes further and constructs his "colour tree" on the criterion of perceptually equal steps - the shape of a tree is thus derived from "branches" of various length meeting in the vertical grey scale "stem".

2.5. Lightness

Another criterion that can be included in a colour system is the lightness which is intrinsic to each colour. Lightness is conceptually included in all colour systems as the grey scale between black and white. But in order to show that yellow is lighter than blue, and possibly also that red is lighter than green, one cannot retain a pure hue circle, triangle or square perpendicular to the grey scale. One geometrical solution for the colour sphere is to move the pure hue "equator" so that it no longer runs horizontally but diagonally.



## 2.6. Conclusion

The various colour spaces emphasise different aspects of colour. Their final shape depends on the order in which the criteria for their construction are used. Although all spaces assume an equally graded grey scale from black to white, the following possibilities emerge for the rest of the construction (there are probably even more, but these are the most obvious ones):

1. black-grey-white line

2. Choose main criterion:

1. fundamental primaries
2. primaries for additive colour mixture
3. primaries for subtractive colour mixture
4. no primaries, but equal phenomenal steps

3. According to criterion:

1. fit colours into line
2. add arcs to accommodate all colours
3. add further dimension

4. If further dimensions

a) two Dimensions:

1. circle
2. triangle
3. square
4. other

b) three Dimensions:

1. from round base:
  - a) sphere
  - b) cone or double cone
  - c) cylinder
  - d) irregular shape
2. from triangular base:

- a) pyramid (or double pyramid)
- b) irregular shape
- 3. from square base:
  - a) cube
  - b) pyramid (or double pyramid)
  - c) irregular shape
- 4. Completely irregular shape
- c) more dimensions
- 5. Choose further criteria in order of preference:
  - a) saturation
  - b) lightness
  - c) equal phenomenal steps
  - d) available colour pigments
  - e) other

This overview alone allows for eight kinds of lines and arcs, 16 two-dimensional shapes and 40 three-dimensional shapes, all of which can be given further criteria in different orders of preference, so that we arrive at well over a thousand possible combinations, even if all options named "other" are assumed to be just one other option.

Of these other options I would like to highlight the following two: Silvestrini bases his own pyramid shape colour space on black, white, transparent and opaque corners, and places all colours more or less within this pyramid.<sup>12</sup> One other unusual colour space is that of Albert-Vanel who treats the four primary colours like planets whose secondary colours move like moons around them.<sup>13</sup> Other systems may reflect practical applications such as the RGB system for the mixing of colours on the television screen, or several systems by producers of paints and varnish. What is important about the variety of these colour systems is that despite their obvious differences they are all based on the same criteria, albeit in different orders of

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<sup>12</sup> See Silvestrini, pp.128-9. (I have tried to get in contact with Silvestrini but his publishers have disappeared.)

<sup>13</sup> Silvestrini, pp.126-7.

preference. This suggests that the qualitative colour relations within hue, saturation and lightness are universal.

### 2.7. The re-establishment of the arc

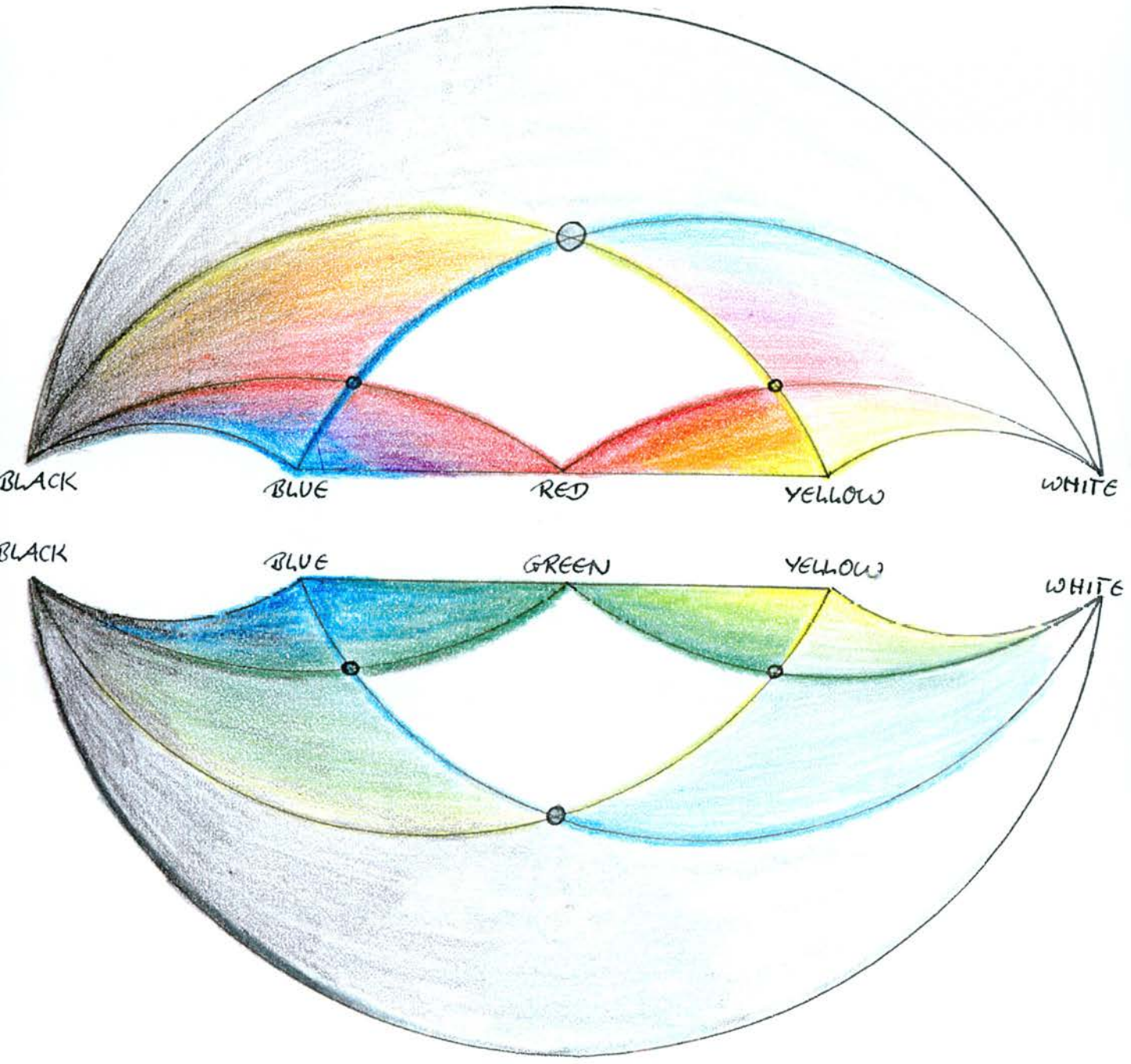
Copying the arc of Franciscus Aguilonius I thought of trying out more possibilities of the arc. I first drew a coloured version of his arc with two halves, one of which included red and the other green (see next page). What intrigued me was the connection of each colour with black and white respectively. As with all colour systems (I have seen) black and white form opposite poles with grey between them. There is no other direct route from black to white, but they are both linked to each of the primary colours. If one follows the line from black and white to each colour one notices two things: first, that it takes longer to get from black to yellow than it takes to get from black to blue, and secondly, that the distance between black and blue is the same as that between white and yellow. So what we get in this illustration is idealised lightness of each colour.<sup>14</sup> As each colour approaches black or white it loses saturation, so that the double arc includes the black and white scale, the pure hues and their mixtures, saturation, and lightness. What is visually more intriguing however, is the cross-over between blue and yellow. This cross-over is necessary to illustrate the relative lightness of each colour. As yellow and blue become less saturated they have equal lightness only in middle grey so that another measure of their individual lightness is their relation to middle grey, which blue crosses on its way towards white and yellow on its way towards black, so that blue is shown to be darker than middle grey, and yellow lighter than middle grey.

Last but not least there are two obvious gaps in this diagram: the first is that between the top and the bottom arc: while the two ends could be connected (see below) their middle cannot - the geometrical gap between red and green is thus illustrated. The second gap is the soft trapez shaped centre piece of each arc. It cannot possibly be painted in because these are the areas in which blue and yellow cross over each other.

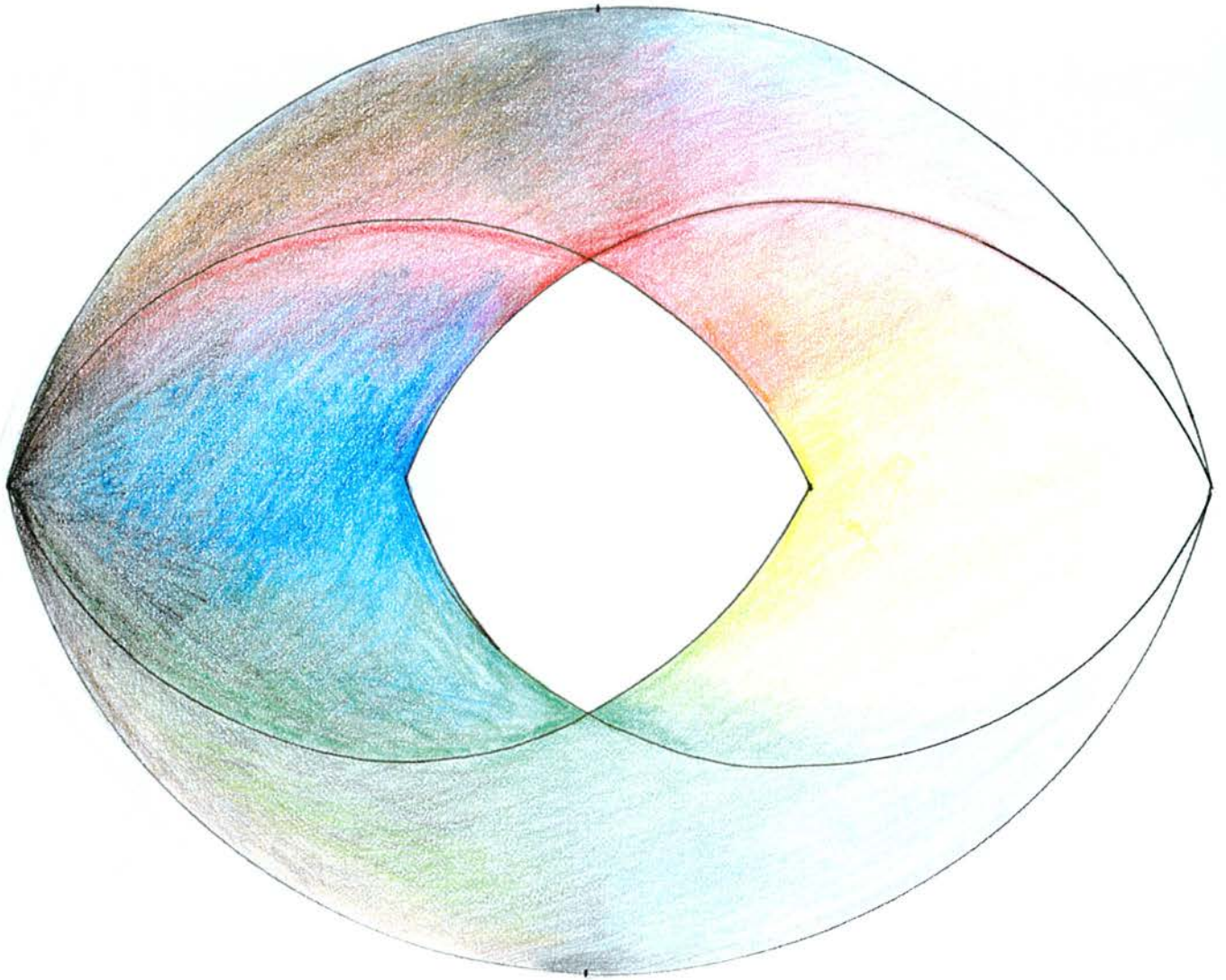
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<sup>14</sup> One might argue that to scientists in the early seventeenth century lightness was still more important than hue was.

First Attempt at a Double Arc



My Version of the Double Arc



This gap thus illustrates the gap between yellow and blue which cannot be reconciled in one place (thus illustrating the truth that nothing can be blue and yellow all over at the same time).

## 2.8. My own double arc

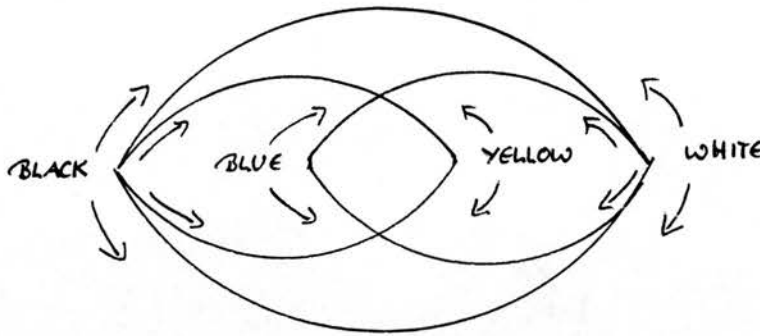
The beauty of this double arc made me want to reconcile the two sides to see what would happen. To avoid the meeting of red with green I moved each of them into the previously grey gap between yellow and blue, and thus I arrived at the following shape (see previous page). A closer look at this shape reveals that it is a colour sphere turned inside out with one hemisphere turned opposite the other. I have not seen any other diagram like this, but I believe it to be a successful illustration of colour relations.

Like the double arc, this figure illustrates lightness. Again there is a longer path from yellow to black and blue to white than from yellow to white and blue to black. The two paths again cross over, but this time the neutral grey gap is filled by red and green respectively. On the lightness scale red and green are thus right between blue and yellow as well as in the middle between white and black,<sup>15</sup> so that the lightness of blue and yellow is no longer measured by their relation to middle grey but by their relation to red and green.

The beauty of this figure lies in its dynamics - in a very Goethean way it demonstrates the polarities and activities of colour:

### 1. Lightness

Black and white move towards the pure colours in an embracing way, and the colours themselves move outwards through red and green towards their opposite (lightness) poles (please see illustration next page).



## 2. Saturation

All colours are most saturated in the middle and least saturated at the edges. This draws our attention inwards (it is difficult to look at an unsaturated patch of colour for a while without finding the eye distracted by a saturated colour).

## 3. Primaries and Complementaries

The four primary colours are indicated by the four soft corners of the centre. As in Goethe's *Farbenlehre* the opposition between yellow and blue is stronger than that between red and green: Yellow and blue spread around the centre towards each other, while red and green seem to recede from each other in difference.

I am aware that the shape itself contributes greatly to these colour dynamics, but as colour systems are meant to illustrate colour relations this is an advantage rather than a flaw. As I said I could improve the lightness relations by shifting the red slightly to the right and the green slightly to the left, so that their differences in lightness would also be illustrated (although this would mar some of the symmetry).

The advantages of this colour illustration over the colour sphere and many other three-dimensional systems is not just that we can see all its colours at the same time without losing the geometrical connections, but also that the least saturated colours are

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<sup>15</sup> Because, strictly speaking, red appears to be lighter than green, I could improve this figure by shifting red slightly to the right and green slightly to the left to yield a slightly less symmetrical figure which would,

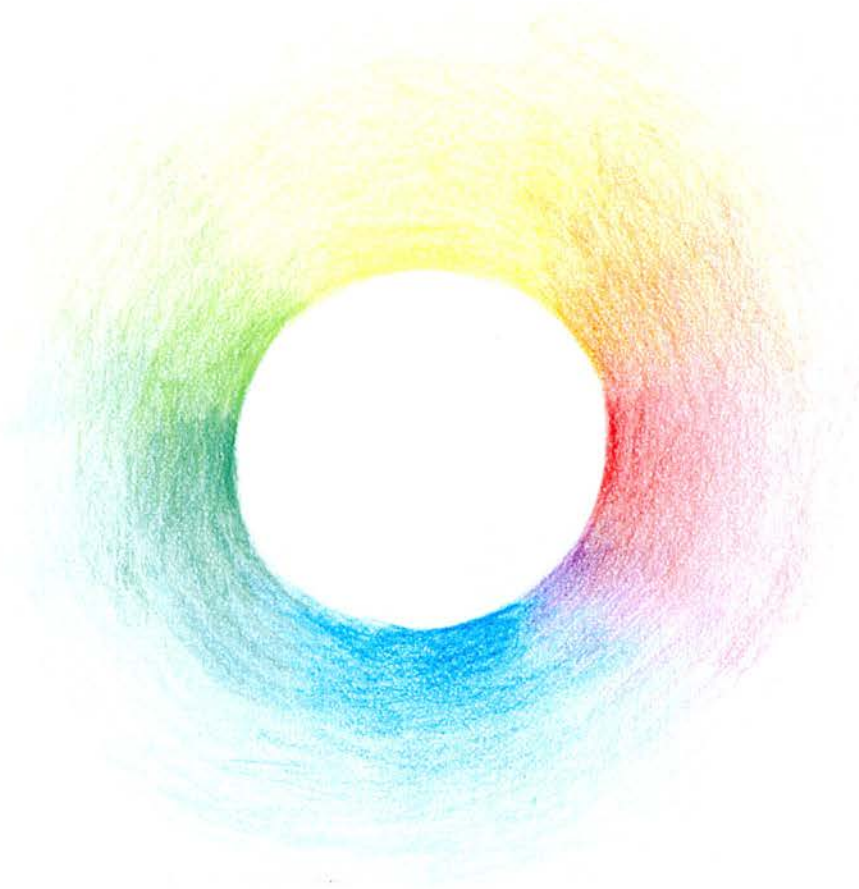
placed around the periphery. This means that the figure is genuinely closed. It could accommodate transparent colours in the centre. If we imagine an increasingly transparent gas around the colour sphere, a cross section around the equator would look as follows (see next page). Because we would usually look at the three dimensional sphere rather than its cross section, however, we would usually look through the decreasingly transparent gas at opaque surfaces of the same colour as the gas. This means that we would not in fact perceive the transparent gas at all (see ch.VII). If we fill the same gas into the inner gap of my two-dimensional figure, on the other hand, we can see it. The figure thus also becomes another illustration of the neutrality of transparency: The periphery shows black, white and grey as colour neutral and the centre shows that in transparency too all colour differences are lifted.

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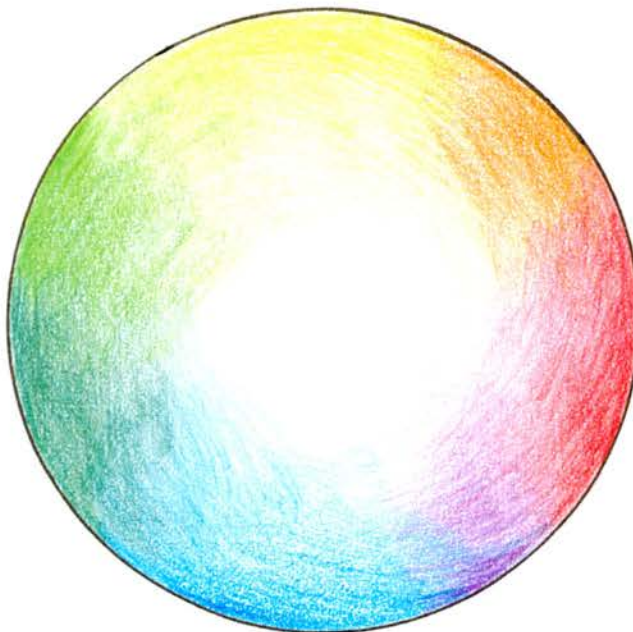
however, also illustrate the affinity between blue and green ,and red and yellow respectively.

## Transparency

1. Transparency around the periphery of a colour circle or sphere:



2. Transparency at the centre:



### 3. Novel Hues and Impossible Colours

To understand what a novel hue or an impossible colour could be, we first have to understand what counts as a colour. If, as a first premiss, we assume that our colours are the set of all points included in our colour space we can define a novel colour as a colour which lies outside our colour space, and an impossible colour as one which is made impossible by the rules of our colour space. A novel hue is not necessarily an impossible colour as it might not contravene any of the colour rules, but an impossible colour is always a novel colour as it cannot be accommodated by our colour space. (It is not a novel hue in the strict sense but a binary colour for reasons given below).

#### 3.1. Novel hues

There are two possible definitions of what counts as a novel hue, and not surprisingly these definitions depend on the ontology of colour.

##### a) Subjectivist novel hues

According to the subjectivist a colour is a novel hue if I or any member of my community has never seen it or anything like it before. The novelty of the hue thus depends strictly on my or my community's previous colour experiences.

Examples of novel hues in this sense are of individuals who have been cured of blindness or of colour blindness as well as of those people who for whatever reason grew up in mono- or diachrome surroundings (we can easily make up counterfactual examples for the case of the subjectivist - aliens from purely red or blue or whatever coloured planets, people brought up in unicoloured laboratories, people who perceive the world only through monochrome monitors, and so on and so forth). Under reasonably normal living conditions we might think of a family brought up in Greenland who is brought into the rain-forest with its amazing colours. This example, however, also shows the weakness of the subjectivist position: we would not expect these people not to know that they were seeing colours, but merely expect them to be surprised by the richness of the colours. This could be shown by the way they would

define or describe the new colours. We would expect them to make up names including their familiar colour terms, such as "luscious red-yellow" or "richer moss colour". (Just as the Europeans named the strange creatures of the rain-forest "giant elephant shrew" and such like.)

The main weakness in the subjectivist definition of a novel hue is that the novelty depends entirely on contingent factors (and the degree of contingency becomes clear when we look at the kind of counterfactuals subjectivists use to support their case).

#### b) Objectivist novel hues

A stronger definition of "novel hue" must rest on a stronger notion of what counts as a colour. But we have to be very careful not to go to the other extreme: Thompson shows that it is easy to denounce the whole concept of a novel hue as meaningless by saying that "It is a conceptual truth that something is a colour only if it has a location within colour space, and there is no room within the closed space for a novel hue."<sup>16</sup>

We thus need to ask what makes the novel hue a hue at all, if it cannot be placed within our colour space. It needs to have some resemblance to at least one of our colours and yet it must not be a mere binary hue such as reddish-blue (purple) but must be neither reddish, nor bluish, nor yellowish nor greenish. The novelty of the hue must be intrinsic to the hue and yet we must recognise it as a hue.

Thompson gives a detailed and excellent account of what a novel hue is. At the same time he refutes Frank Jackson's well known argument which claims to show that even if we had all the scientific information in the world we would not understand what a novel hue would look like.<sup>17</sup> Thompson or I do not doubt that we cannot have exactly the same experience as someone who sees a novel hue, but this in itself is true of all experiences .

Just as I can construct a picture of an object by the descriptions of another person I can also construct a picture of the novel hue (even if I cannot see it). The construction works as follows:

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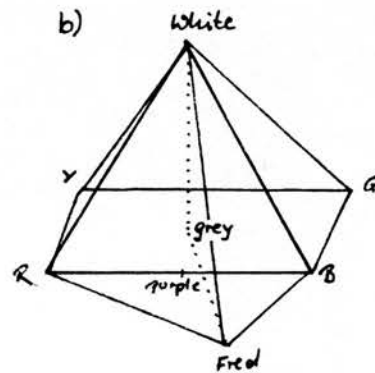
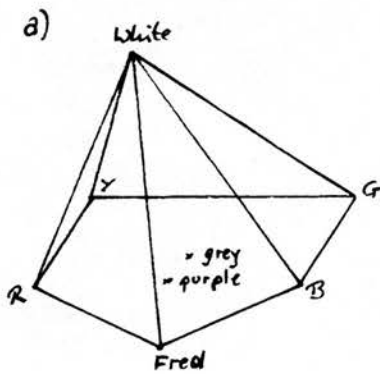
<sup>16</sup> Thompson, 1995, p.273.

<sup>17</sup> Frank Jackson, "Epiphenomenal Qualia", *Philosophical Quarterly* 32 (1982), pp.127-136.

1. We assume that Fred, who claims to see two entirely different hues where we just see red, shares our other colour concepts. He thus sees blue, yellow, green and either red and "fred" or "fred1" and "fred2" - which is something we can find out by comparing the use of our colour words. For now let us assume that Fred sees blue, yellow, green and red plus an additional colour "fred".

2. Fred knows that a hue is a saturated colour and claims that the colour "fred" behaves like the other hues in that it can be more or less saturated and lighter or darker. But if it does behave like the other hues then it must have a resemblance connection with at least one of our colours, a connection just like the route from blue to red: red itself is not bluish and blue itself is not reddish and yet we have a resemblance route between the two via bluish-red and reddish-blue.

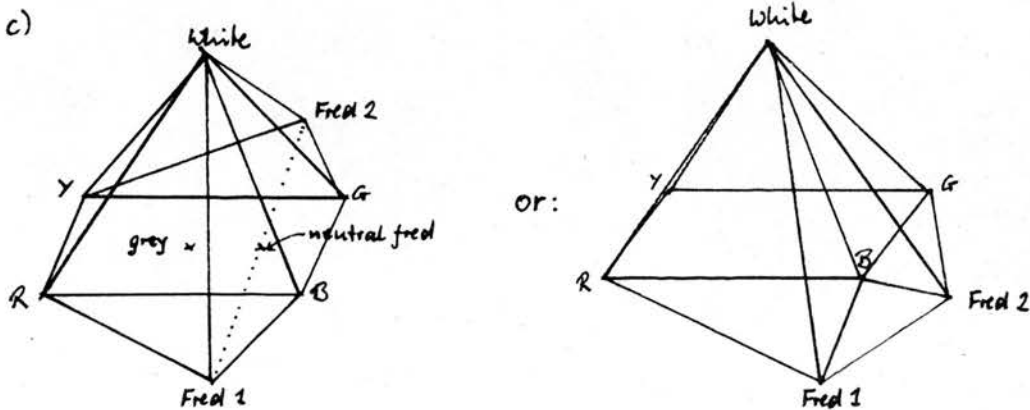
For the sake of the argument let us assume that "fred" has a resemblance route to both red and blue, just as red has a resemblance route to both blue and yellow. We thus arrive at one of the two following colour spaces (I leave out the black half of the pyramid for sake of clarity).



3. These drawings alone show that Fred's colour space must be bigger than our colour space which is either completely or partially contained in it.<sup>18</sup>

4. Fred's colour space probably gains an extra dimension. It is not immediately obvious why Fred's colour space should not merely be based on the pentagon (a) rather than our square plus another dimension (b), until we think of the colour purple. If Fred's colour space is basically a pentagon then it cannot accommodate a saturated purple (see a). This is of course a possibility, but I am trying to explain what someone would see who could see *all* of our colours plus a "novel" hue. So a person who claims to see five primary hues, four of which are the same as ours, either lacks one of our binary hues (in my example, purple) or gains a further dimension in the colour space. In this case we need to beware of a tempting error: Only because Fred's hue is on the resemblance route to both red and blue this does not mean that his colour "fred" resembles purple. After all, blue is a primary hue on the resemblance route from red to green but blue is most certainly not "reddish-green".

5. Because the above diagram looks very odd, Thompson is probably also right in claiming that Fred would not merely see one but two novel hues. The reason for this is that our colour space is constructed through opponent pairs, and if Fred shares most of our colour concepts he must also share our opponent structure (diagram c).



<sup>18</sup> Thompson includes the possibility of partially shared colour spaces (see pp. 272-278). I only omit this possibility in what follows because the argument itself does not change whether we have partial or total integration of our colour space in Fred's colour space. It makes sense that a person with radically different colour vision could have four primary hues and share neither yellow nor green with us (but only blue and red). This colour space would then be connected to ours in the colours red and blue, an understanding of which would insure us that this other person did indeed see colours in our sense.

### 3.2. Impossible Colours

I said above that impossible colours are impossible according to the rules of our colour space. These rules use primary colours as reference points. Thus they might prescribe that there is always a series of binary hues between two primary hues, and that colours at opposite ends of the colour space are complementary to each other, and the like. Because primary colours serve as reference points for the rules, an impossible colour is not likely to be a primary colour: the primary colours as reference points are the names in the rules, not the objects of the rules.

Whether our colour space is based on three or four primary colours, it always includes the notion of complementaries. As the rules apply for the spaces between the primary colours and their complementaries, depending on the kind of primary colour and its corresponding complementary we therefore get different kinds of impossible colours:

1. The fundamental complementary is based on the idea that it is perceptually opposed to its primary (see section 1.2 of this chapter) so that one cannot see what an "in between colour" would look like. Reddish-green is the most famous of these impossibilities, as one does not understand what to imagine when asked to think of a reddish-green.
2. The additive primary colour is defined as the colour which yields white when mixed with its complementary in equal proportions. An impossible colour in this context would thus be a colour which although complementary did not yield white. This is a genuine contradiction, and the only solution to this problem can be an empirical one: one and the same colour may be genuinely complementary to a certain colour in one context but not in another. This does not, however, make it a logically impossible colour.
3. The same is true for subtractive colour mixture: the additive primary and its complementary mixed in equal proportions yield a monochrome grey. Any colour that does not yield this grey is not a genuine subtractive complementary. So, either a truly impossible colour both yields and does not yield grey when mixed with its complementary (which does not make sense), or it does so in different contexts, in which case it is not genuinely impossible.

Philosophers are generally interested in the first kind of impossible colour. But before I discuss this in some more detail I would like to say that artists are of course aware of problems regarding subtractive colour mixture. The only painting I own is such a painting: trying to copy the colour of its background, which had escaped my terminology completely, I found to my surprise that it contained a light grey together with a mixture of blue and orange - two complementary colours (see colour circle I). As most of the figures in this abstract painting are blue or contain blue, the blue content of the background had totally escaped me. This then is the closest I can come to an impossible colour with regard to subtractive mixing.

But let us return to the reddish-green. As with my orange-blue painting it seems impossible to *see* something *as* red and green at the same time (after all I never *see* my painting *as* orange and blue at the same time). Thompson refers to an experiment in which subjects report seeing reddish-green under highly abnormal laboratory conditions. Even if this experiment is valid (which Thompson and Hardin doubt),<sup>19</sup> it does not show that we can see reddish-green under normal conditions or are able to imagine what it would be like. In agreement with Hardin, I think that if this experiment is taken as valid for the argument, then we have to say that we can see *any* colour in our colour space. This, however, would make the structure of the colour space and hence the notion of a colour space itself redundant. As I shall argue in my next chapter, our whole colour vocabulary would thus become inapplicable, and hence the notion of an impossible colour meaningless.

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<sup>19</sup> Hardin, 1988, p.126; Thompson, 1995, pp.269, 273.

#### 4. Functions of colour spaces

The prime function of colour spaces is the illustration of colour relations. But the preference of some criteria over others leads to different relations and hence to illustrations of different functions. In principle we can distinguish between three functions: one is to idealise colour relations in order to make a theoretical (philosophical or aesthetic) point; the second is to try and capture the phenomenal colour space of human beings; and the third is to list in as practical an order as possible the colour materials available. This third kind of colour space ranges from simple charts in decorators' shops to the complex systems of Max Bense (chemistry, textiles), Alfred Hickethier (printing), Harald Küppers (printing) and ACC (varnish).

One should think that the "phenomenal" colour space is universal. But while it is generally accepted that it must have three dimensions to show hue, lightness and saturation it is unclear whether the notion of a fundamental primary colour should be included, and if so, whether green counts as such a colour. Because of the human opponent systems, in which red and green are the second opponent system beside yellow and blue, green is usually treated as a primary colour. But individual people choose slightly different shades of colour as "pure", and so any phenomenal colour space is a generalisation on the basis of statistical evidence.

The first kind of colour space not merely generalises but idealises. To me this is the most philosophical of all colour spaces as it tries to show the colour relations *in principle* and not with regard to minor individual differences. The colour sphere with four opposite primary colours (including my inside-out version of the sphere) is best at illustrating our colour concepts, while triangular shapes with the three primaries red, blue and yellow illustrate harmonies and other aesthetic aspects of colour.

I shall return to each of these in the following two chapters: The aesthetics of a colour system based on three primary colours will be discussed in chapter X on painting, and the logic of four primary colours in chapter IX on colour vision and colour language.

## 5. Conclusion

Despite the varying shapes of the systems and the varying numbers of primary colours all these systems have a few things in common which I therefore conclude to be absolutely essential and necessarily true about colour:

### 1. Lightness

Even if it is not always easy to group colour samples with their respective grey shade or other hues of equal lightness,<sup>20</sup> we do believe that there is an objective lightness value which each colour possesses. Naturally, the context and especially other colours will change our judgments in individual cases as far as to the degree of optical illusions, but in any context yellow is lighter than blue and there is no doubt about it. Some colour systems reflect this aspect of colour while others neglect it in favour of other aspects.

### 2. Saturation

Although it is relatively easy to judge whether a colour is saturated or not, the possible degrees of saturation differ from colour to colour. By this I mean that if we take a grey shade of the same lightness as the saturated colour and then count the number of steps needed to get from one to the other, this number will differ with each colour.<sup>21</sup> The shortest steps lead from yellow to an almost white grey, the longest from red to middle grey. This aspect is neglected in most colour spaces.

### 3. Hue order

There is one and only one way of representing all saturated colours in a circle (if we ignore differences between clockwise and anti-clockwise orders). Even though the space which each colour occupies might vary from one figure to the next, the colour it is next to will not change. Because of this essential order of hues I agree with Wittgenstein that "I want to say that there is a *geometrical* gap, not a physical one, between red and green."<sup>22</sup>

But we may want to ask where this geometrical gap exists. As Westphal correctly observes

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<sup>20</sup> This task is much easier for someone who is totally or partially colour-blind.

<sup>21</sup> The number of steps is judged in the following way: we have three steps if two colours by themselves are indistinguishable but a third colour is indistinguishable from the second and clearly different from the first. (This is an interesting solution to some problems about vagueness.)

<sup>22</sup> Zettel 345 (p.65e)

"The fact that the most effective means of representing the order of [chemical] elements in geometrical order does not mean that the basis of the order is a geometrical one." (p.95)

In other words, we cannot deduce from the geometrical necessities of our colour systems that there is a geometrical order in nature which we can somehow access and represent in pictures (like Goethe did with regard to his *Urphenomena*). The objectivity of the order of colours does not decide issues between colour realism and idealism.

## IX

### COLOUR VISION, COLOUR BLINDNESS, and COLOUR LANGUAGE

In this chapter I shall argue that our colour language necessarily depends on our colour vision. Goethe treated colour vision in his chapter on "Physiological Colours", and Schopenhauer's *On Vision and Colour* established a hypothesis about colour vision which stimulated further physiological research in the nineteenth century. The scientific research into colour vision is still not completed and there is some fascinating work going on at the moment which covers all aspects of colour vision, from chemistry and neurophysiology to evolutionary theory and psychology.<sup>1</sup>

Schopenhauer's explanation of colour-blindness is a quantitative one.<sup>2</sup> But although there is a quantitative aspect to colour blindness it is not enough to say that the colour blind live in the same visual world as the normal sighted do except that their world lacks some of the colours and replaces them with grey shades, such as the daguerrotype did in Schopenhauer's time<sup>3</sup> and black and white films and photographs have done since Wittgenstein's time. Instead I shall argue that the colour-blind live in a different visual world altogether.

Wittgenstein is the only philosopher in this dissertation who writes about the philosophical issues connected with colour blindness, although Goethe gets close to Wittgenstein's (and my) understanding of colour blindness in his section "Pathological

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<sup>1</sup> Thompson's *Colour Vision* (1995) combines details of current scientific research with philosophical issues. An older book of the same title by Hurvich (1981) gives more details, though on a more limited philosophical scope. A useful shorter introduction can be found in Hardin's *Color for Philosophers* (1988).

<sup>2</sup> Schopenhauer's short chapter "Concerning Some Injuries and an Abnormal Condition of the Eye" (S&F §12) is a mere list of a few cases of colour blindness which he claims to explain by his theory of the division of the retina.

<sup>3</sup> "Thus they see only the gradations of light and dark, and consequently the world appears to them like a black and white picture, or a copper engraving, or as a daguerrotype." (Payne, p.59) : "Sie sehn demnach nur die Gradationen des Hellen und Dunkeln, folglich stellt ihnen die Welt sich dar wie ein getuschtes Bild oder ein Kupferstich oder ein Daguerrotyp.." (S&F §12, p.266)

Colours", an appendix to "Physiological Colours". Here Goethe describes talking to colour blind people in the following way:

"If one leaves the conversation with them to chance and merely asks them about [the colours of] surrounding objects, one will get into the greatest perplexity and fear to go mad."<sup>4</sup>

In the following pages I shall try to explain why it is so difficult to talk about colour with colour-blind people. I begin with Goethe's and Wittgenstein's comments on colour-blindness followed by a philosophical analysis of the learning of colour words. My hypothesis is that this learning process includes the construction of our phenomenal colour space, and that therefore the meaning of colour words includes their position in the colour space. As colour deficient people cannot distinguish between some colours they cannot construct the same colour space as people with "normal" colour vision can. Without this space, however, individual colour words are as meaningless as individual chess pieces making arbitrary moves would be.

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<sup>4</sup> "Wenn man die Unterhaltung mit ihnen dem Zufall überläßt und sie bloß über vorliegende Gegenstände befragt, so gerät man in die größte Verwirrung und fürchtet, wahnsinnig zu werden." (Fl.109)

## 1. Goethe and Wittgenstein on Colour Blindness

### 1.1. Goethe on "Pathological Colours"

Three aspects of Goethe's section "Pathological Colours" can also be found in Wittgenstein, and I shall very briefly list them before I give a more detailed account of Wittgenstein's arguments:

1. Goethe does not say what it is that the colour-blind see but merely notes their lack of discrimination between colours which he himself can clearly distinguish. Goethe's only factual statement in the whole section is that the colour-blind must have less colours than we do (Fl.§110). He is cautious about whether the colour-blind see two (for them indistinguishable) colours as the one or as the other of the two, and Goethe's proposed solution to what colour-blind people might be seeing is careful: In order to show what the colour blind "probably" ("wahrscheinlich") see he paints a landscape with a pink sky and yellow-brownish tones where we usually see green - "like they appear in autumn" (Fl.§113). The picture, although not wholly successful,<sup>5</sup> is a better attempt at trying to show the world of the colour-blind than a verbal description is because it does not claim to understand the *concepts* of the colour-blind.

The point is that one could paint a picture which looked absurdly coloured to the majority of people but perfectly normal to a colour-blind minority. This minority would therefore not notice the difference between this picture and the same picture painted in "normal" colours. The possibility of the absurdly painted picture does not imply that the colour-blind see the world like "normal" observers see that absurdly

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<sup>5</sup> The picture is reproduced in volume I,7 of the Leopoldina edition of Goethe's scientific writings. When I showed it to my colour blind friend he did not notice anything strange about it, and a Dr.Brandis from Copenhagen commented that although the painted landscape is not quite like he sees it, he too did not notice the pink sky (letter to Goethe from 11.1.1811, printed by Goethe in *Hefte zur Naturwissenschaft Überhaupt* (1817-1822, Heft I,4) and reprinted in *Leopoldina* I,8, pp.215-220).

coloured picture; it merely shows that they do not see the difference between that picture and ours.<sup>6</sup>

2. Goethe bases his understanding of colour-blindness on what colour blind people *say* they see, and as my introductory quotation shows, he is aware that we cannot simply translate from their language to ours, and nor can we teach them our language. Incidentally, the letter by Dr.Brandis mentioned above also tells the amusing tale of a colour-blind shop assistant in a fabric shop who was told to learn colour names using coloured samples of silk.

"..and now the poor boy sat there for days and studied [the samples], hoped joyfully to have understood the matter, and as a result of his knowledge the next customer received pink instead of light blue." Dr.Brandis correctly observes: "If that person really could not see any difference between pink and light blue then he could not hope to learn it."<sup>7</sup>

3. Most importantly of all perhaps, Goethe realises that colour-blind people have their own rules and will throughout their lives show symptoms of the underlying laws governing their colour vision:

"Unhealthy [colour blind] phenomena indicate in like manner [as healthy ones] organic and physical laws; for as an individual living being deviates from the rules which formed it, it will strive towards the general life, always on the regulated path, and throughout its whole course it will make the principles apparent from which the world originated and by which it is held together."<sup>8</sup>

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<sup>6</sup> If it is true that John Constable was colour-blind (I am still trying to find a reliable source for this information), it would be interesting to take his paintings as an example to see in how many ways we could alter them without a colour-blind person noticing the difference.

<sup>7</sup> "... und nun saß der arme Knabe tagelang und lernte, hoffte freudig, die Sache ergründet zu haben und das Resultat der Gelehrsamkeit war, daß der nächste Käufer Rosenrot für Himmelblau erhielt." (*Hefte zur Naturwissenschaft* I,4; p.217)

<sup>8</sup> "Die krankhaften Phänomene deuten gleichfalls auf organische und physische Gesetze; denn wenn ein besonderes lebendiges Wesen von derjenigen Regel abweicht, durch die es gebildet ist, so strebt es ins allgemeine Leben hin, immer auf einem gesetzlichen Wege, und macht uns auf seiner ganzen Bahn jene Maximen anschaulich, aus welchen die Welt entsprungen ist und durch welche sie zusammengehalten wird." (Fl.102)

Eastlake gives a different and unambiguous translation of the whole paragraph; he translates the clause "durch die es gebildet ist" as "with reference to which it was constructed". It seems that Eastlake's translation assumes a creator with set rules according to which He creates all beings, so that even deviations can be understood as deviations from His rules rather than as completely different rules. I am not sure which is the better interpretation. Eastlake's one explains the comprehension of colour-blindness as understanding their deviation, while my interpretation assumes the colour blind to have their own rules.

Thus the colour-deficient do not mistake just any colour for another colour but regularly mistake pairs of colour for each other.

The importance of Goethe's paragraphs is that they make us realise that the colour blind and the colour normal live in two distinct visual worlds. The differences between these worlds become apparent in the inability of translating the concepts of one world into the concepts of the other, even though it is assumed that each world has a set of rules which are followed consistently by its members.

## 1.2. Wittgenstein and the Definition of Colour Blindness

Wittgenstein only uses one argument to convince us that we cannot speak of the colour blind as "seeing red as green" or "seeing red as grey". His argument rests on the fact that colour blindness is wholly discovered, defined and judged by people with normal vision. I shall look at this argument and its implication in some detail:

First of all, the definition of colour-blindness is a negative definition: that person is called colour-blind who cannot discriminate between all or some of the colours which the majority of the community can discriminate between. This definition alone includes three issues: one, that the majority of people are by definition "normal"; two, that the so-called "normal" can differentiate between more colours than the abnormal can, which is why the latter are called colour "deficient" or "blind"; and three,

that these terms are derogatory although "not every deviation from the norm must be a blindness, a defect".<sup>9</sup>

a) The majority of the population have normal colour vision.

The fact that we have no special word for people who are *not* colour blind implies that they are in the majority, are "normal".<sup>10</sup> This is reflected in the way we learn the word "to see" before we learn the expression "to be blind" (RC.III,339), as well as in the fact that colour blindness is an area of research in psychology, which as a profession attends to abnormalities (RC.I,16; III,55,319).

b) Colour-blindness is lack of a specific ability.

What we mean by abnormalities are deviations from normal behaviour. Colour-blindness manifests itself in the abnormal use of colour terminology and is therefore not apparent in young children and often goes unnoticed for many years. (Teachers and parents may believe that colour blind children are simply acting stupid or obstinately rather than look for physiological reasons for their behaviour.) To establish the symptoms of colour blindness it is useful to imagine someone colour blind pretending to have normal vision: That person would do nothing but copy the utterances of other people. Thus a colour blind person might copy people saying "look, what a lovely blue", or "isn't that a horrible shade of green" when looking at particular paintings. Similarly someone with normal vision might copy a colourblind person by pretending to be unsure about colours ("is this green or brown?") or by deliberately using the wrong colour names (for instance, by saying "I really like this orange jumper" when the jumper is lime green; see also R.C.III, 285).

c) Colour-blindness is nothing but lack of ability.

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<sup>9</sup> "... und nicht jede Abweichung vom Normalen muß eine Blindheit, ein Defekt sein." (RC.I,9; III,31)

<sup>10</sup> In Europe about 8% of men and 0.45% of women are red-green deficient. All other forms of colour-blindness and deficiency are very rare. (dtv *Brockhaus Lexikon*, 1986, volume 5, p.226)

The verbal deviation is expressed in a negative definition because the colour-blind do not behave differently in any other way except that they lack some discriminatory powers (RC.III, 164, 281). To put it simply: "*Here* we see two colours, he sees only *one*."<sup>11</sup> Dichromats or monochromats would not be called colour-*deficient* or colour-*blind*, if they had some other ability such as excellent night vision, a particular sensitivity to blue, or even a more extraordinary ability such as X-ray vision. In that case human vision would be conceptually divided into night-vision and day-vision, or blue-vision and red-vision, or X-ray-vision and surface-vision, rather than into "normal" and "deficient" vision. But as it is, the colour-blind, although often slightly better at discerning lightness contrasts, are defined as nothing but people who cannot see colour as well as other people can.

If the whole concept of colour blindness is thus determined by the discriminatory powers of the majority and their consensus of what better colour judgment consist in<sup>12</sup> then we should expect to have experts of colour discrimination. Just as wine tasters have a detailed vocabulary to describe the nuances in the flavours of wines, a colour expert should be able to name colours of which I, for instance, could only tell roughly between which colours they were located. As far as I am aware there are no such experts (presumably because of a lack of consumer goods which require such experts), but we can imagine what such an expert would do. Wittgenstein's comparison to absolute pitch (RC.III,292) is particularly interesting as it is notoriously difficult to judge colours outside of colour context. Similarly, the recognition of a musical note without reference to other notes is extremely difficult. Thus most people possess relative rather than absolute knowledge of colour, even if there may be artists who are able to identify individual colours independent of context (like exceptional musicians who have absolute pitch).

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<sup>11</sup> "Wir sehen *hier* zwei Farben, jener nur *eine*." (RC.III,54)

<sup>12</sup> see also PI, Part II, sect.11, p.227e: "There is such a thing as colour-blindness and there are ways of establishing it. There is in general complete agreement in the judgments of colours by those who have been diagnosed normal. This characterises the concept of a judgment of colour."

"Es gibt Farbenblindheit und Mittel, sie festzustellen. In den Farbaussagen der Normalbefundenen herrscht, im allgemeinen, volle Übereinstimmung. Das charakterisiert den Begriff der Farbaussagen." (p.574)

### 1.3. The verbal behaviour of colour-blind people

One of the reasons why psychology does not describe the behaviour of people with normal vision is that in a sense seeing is not an activity and hence does not manifest itself in particular behaviour (RC.I.,81). To be able to see, is a state rather than an activity. It is the normal state of the majority of people, just as having one head and two arms is. Colour-blindness is also a state but it becomes manifest in diverging expressions of colour judgments. Hence we cannot observe colour-blindness itself any more than we can observe colour-vision (RC.I.,82) but we *can* observe judgments made by the colour-blind.<sup>13</sup> Just as we do not notice normal behaviour such as someone walking along the road or riding a bicycle but do notice when they skip and jump or fall off their bikes, we notice the strange use of colour terminology by the colour-blind.

Because the colour-blind are defined by lack of ability rather than by some positive power, the colour-blind cannot say, "Only I know whether I am colour-blind." (RC.I.83). This they cannot say because they *cannot know* themselves whether they are colour-blind or not unless someone tells them. It is only other, "normal" people who notice their lack of discrimination, and to the colour-blind they may at first seem to fuss about nothing. My colour-blind friend said that when he was to mix colours in school, and all the other children were able to do the task except for him, he thought that there was some kind of conspiracy against him and that they were all just pretending to see something that was not really there. Like the child in the story of the emperor's new clothes he saw nothing where others claimed to see something. But when looking at colour mixtures the others *do* see something, and there are clear criteria to determine who is colour blind (and with respect to which colours) and who is not. Although the physiological details are well researched, simple testcards suffice to determine colour judgments and hence colour blindness. So, just as a completely blind person can find out whether someone else is blind too (RC.III,334) a colour-blind person can find out whether someone else is colour-blind. And it is interesting to note that it is the

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<sup>13</sup> The difference between the state of being or not being able to see (colour) and the observable behaviour in the expression of judgment can be condensed into Wittgenstein's remark that "The statement, "I see a red circle" and the statement "I see (am not blind)" are not logically of the same sort." - "Die Aussage "Ich sehe einen roten Kreis" und die "Ich sehe (bin nicht blind)" sind logisch nicht gleichartig." (RC.I,84; III,283)

judgments which in the end decide whether someone is colour blind or not. Unlike many medical conditions, colour-blindness is thus not defined by its causes but by its symptoms.<sup>14</sup>

#### 1.4. Colour samples and the learning of colour words

The agreement of judgment by a majority is our only reference point for the learning of colour words, because

"There is, after all, no *commonly* accepted criterion for what is a colour, unless it is one of our colours."<sup>15</sup>

Because the colour-blind cannot see the differences between some of the colours which the normal sighted name as "one of our colours" they cannot learn "normal" colour concepts (RC.III,112). But the same is also true the other way round: the colour-normal could not learn the colour concepts of the colour-blind, if the latter had their own terminology.<sup>16</sup> To reduce a large colour vocabulary to a more limited one is not as simple as it may seem. For while we quantitatively reduce a three-dimensional colour space to a two-dimensional one, the colours around us remain the same. Thus colour normals may find some shades of orange in the same group as some shades of green and others in the same group as red or yellow, so that the learning of a colour blind language game will be a far more conscious and difficult process than the learning of colour terminology in a foreign language, for instance, into which we can translate our

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<sup>14</sup> The causes can be inherited deficiency of photosensitive chemicals, braindamage, but also chemically induced states. These causes determine whether someone has "protanopia", "deutanopia" or "tritanopia" for instance, or whether they have "cerebral achromasopsia". (see also Thompson pp. 144, 163)

<sup>15</sup> "Es gibt ja kein allgemein anerkanntes Kriterium dafür, was eine Farbe sei, es sei denn, daß es eine unserer Farben ist." (RC.I,14;III,42)

<sup>16</sup> RC.I,13, 77; III, 120, 278, 284

own colour concepts - even if the new language consists of fewer terms (thus "kolni" might mean "blue or green" but never "blue or orange").

It is not difficult for us to imagine a people of the colour-blind,<sup>17</sup> but it is difficult to imagine any other colour from the ones we know.<sup>18</sup> If we really think about it, we therefore cannot imagine what colours look like to the colour blind or what darkness "looks like" to a blind man (P.I.424). To understand why colour-blind people cannot use our red and green samples to learn the words "red" and "green" we could compare their difficulty to our difficulty when being asked to recognise ultraviolet or infrared samples. Our red and green samples look exactly the same to the colour blind, and yet we do not know *what* they look like to them. Similarly, ultraviolet and infrared samples look exactly the same to us: as absence of visible light they are black, but in most contexts they are invisible, i.e. transparent, and hence unnoticeable additions to colours which we do see. Thus two flowers may look exactly the same shade of blue to us but be easily distinguishable by insects which can perceive colours throughout the ultraviolet range.

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<sup>17</sup> (RC.I.12,13) - Oliver Sacks's book and television programme *The Island of the Colour Blind* (winter 1996) introduces the reader/viewer to a community in which more than half of its members are colour-blind. Unfortunately, however, the programme shed little light on the colour vocabulary of the islanders but instead concentrated on the sensitivity to lightness which the colour-blind islanders suffered under.

<sup>18</sup> (RC.III.285, 294) - see also previous chapter.

### 1.5. Grey is only neutral to people with colour vision.

We often think that the colour-blind substitute the neutral colour grey for whichever colours they confuse. Once we think about ultraviolet samples, however, we can stop wondering about the meaningless question of whether the colour-blind see certain colours or even the whole world "as grey". As I hope to show, the concept "grey" loses its meaning in this context.

If we think of our colour space as three-dimensional consisting of a black-white axis, a red-green axis, and a blue-yellow axis, the loss of one of these axes implies not only loss of their absolutes, red and green for instance, but also loss of their spatial relations to other colours. Orange for instance, when deprived of its place in relation to the red-green axis merely contains yellow and something we do not know. However, a yellowish green too, contains yellow and something we do not know (hence people with red-green deficiency often cannot distinguish between light green and orange). This "something we do not know" *could* be grey, but it could also be some other colour which appears neutral to the colour-blind person.<sup>19</sup>

Because we do not know whether to call it grey or perhaps brown or simply "neutral", it does not make sense to say of people who see no colours at all<sup>20</sup> that they see everything as grey: they cannot possibly know what the concept grey means because they do not understand its relations to other colours. It is about as senseless to say that colour-blind people see everything as grey as to say that all rap music sounds like musician X to me: for it does not sound like *anyone in particular* at all to me, but just sounds the same - rap. Accordingly we cannot say that a monochrome world looks red or green or grey or purple or any other colour, because without the framework of other colours our usual colour concepts simply do not apply.

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<sup>19</sup> This is not altered by the fact that these people also confuse pink and grey - logically at least it does not follow that their "pink or grey" is indeed pink or grey or any other colour that we know.

<sup>20</sup> By this I mean the exceptional few who are monochromats and hence are sensitive to lightness only, not to individual colours.

## 2. Colour Language

Colour terminology has been investigated in great detail ever since Brent Berlin and Paul Kay published their groundbreaking book *Basic Color Terms: Their Universality and Evolution* (1969). Although some parts of the book have since been challenged, its main thesis still stands. I shall briefly introduce the Berlin and Kay hypothesis, but rather than discussing its empirical foundations I shall instead apply it first to the colour spaces discussed in my previous chapter and then to Wittgenstein's ideas about the learning of colour language.

### 2.1. The Berlin and Kay Hypothesis

By studying the colour vocabulary of some ninety languages Berlin and Kay established eleven "basic" colour terms, which in English are black & white, red, yellow & green, blue, brown, purple & pink & orange & grey.<sup>21</sup> Of these colour terms they claimed that

1. Individuals learn colours in this order.<sup>22</sup>
2. Language communities develop their colour terminology in this order.<sup>23</sup>
3. Hence "the eleven basic color categories are pan-human perceptual universals."<sup>24</sup>

In order to supply neurophysiological evidence for these "basic" colour terms Kay and McDaniel map the colour foci (the best examples of each colour) and the colour boundaries onto neurophysiological responses using fuzzy sets. They drew the

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<sup>21</sup> Wherever I connect two or more terms by "&" these terms belong to the same stage of evolution (be it the evolution of a child learning colour words or of a whole community). Thus a person or community with only three colour terms will distinguish between black/cool (including blue and dark green) and white and red (where yellow might either be covered by the term for white or by the term for red). A person or community with seven colour terms will distinguish between black, white, red, green, yellow, blue and brown, one with eight colour terms will add pink, purple, orange or grey, and so on and so forth. It is important to note that communities with few colour terms do not leave out some colours altogether but cover them by making other terms more general. Yet their typical example of each colour term is never a binary colour. Thus one term covering the English terms "blue" and "green" will either take a clearly blue or a clearly green colour as its primary sample, but not a greenish blue or a bluish green.

<sup>22</sup> A claim apparently supported by evidence from E.Rosch (see Thompson, pp. 209-210)

<sup>23</sup> Further evidence has been found by MacLaury (1987, 1991).

<sup>24</sup> Berlin and Kay, 1969, p.109.

conclusion that our colour terminology reflects pan-human neural response categories.<sup>25</sup>

These findings have been challenged by linguistic counter-examples (Russian for instance has two basic colour terms for blue: light and dark blue)<sup>26</sup> and by doubts regarding method of investigation and strength of conclusion.<sup>27</sup> Altogether I agree with Thompson that

"... the variations in category boundaries from culture to culture, the modest Whorfian effects of colour language on colour perception, and the development of colour categories that cannot be predicted by neurophysiology - suggest that the perceptual content of human colour vision cannot be completely specified in purely internalist, neurophysiological terms."<sup>28</sup>

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<sup>25</sup> Kay and McDaniel, "The Linguistic Significance of the Meanings of Basic Color Terms", 1978.

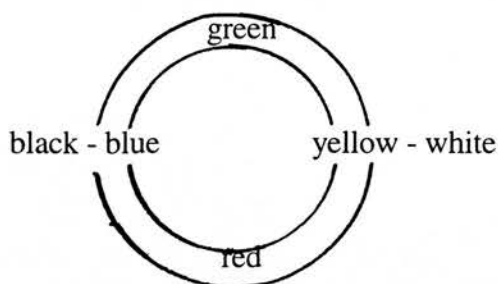
<sup>26</sup> Corbett and Morgan argue that Russian despite this abnormality and its effects on other colour terms is still compatible with the general Berlin and Kay hypothesis. ("Colour Terms in Russian: reflections of typological constraints in a single language", 1988)

<sup>27</sup> See Thompson, 1995 (pp.208-214) for an overview.

<sup>28</sup> Thompson, 1995, p.213



Once blue is established as a separate colour, the colour circle is complete:<sup>29</sup>



This may or may not introduce the black-white polarity as a separate dimension; but once brown is introduced saturation becomes a distinguishing feature (brown = yellow/red & black, pink = red & white, grey = black & white) and thus a third dimension is introduced. Our colour space is complete.

### 2.3. Learning Basic Colour Terms

For now let us assume that we try to teach children with "normal" colour vision. As I explained in my section on colour samples (chapter IV, section 2) the learning of colour words requires two stages: First the child has to learn to apply colour samples to other things of the same colour. This includes the important step of abstracting the colour from other qualities of the sample (shape, texture, etc.) so that the child not only sorts all items of exactly the same sort (red for instance) into one collection but also includes different shapes and textures in the colour (red) collection. We say that a child "knows" the colour term "red" when it sorts all and only red things into the same collection.

However, our colour concepts are not six independent terms,<sup>30</sup> such as "dog", "house", "tree", "cup", "bus" and "pencil" are, but they are necessarily linked to each

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<sup>29</sup> Compare "From arc to circle", ch.VII, sect.2.1.

<sup>30</sup> Black, white, red, green, blue and yellow - I choose these six for no other reason than for the sake of simplicity.

other. Unlike the concept "dog", for instance, which includes the feature "is a mammal" the concept "red" not merely includes the feature "is a colour" but also places red in the colour space. If this is correct then any conceptual analysis of what it means to "place a colour in our colour space" will be circular - much in the same way in which "placing the number 3 between the numbers 2 and 4" cannot be further analysed without circularity.<sup>31</sup> Thus the logic of colour terms is of a much stronger sort than the relationship between different breeds of dogs or species of mammal.

The second step in the learning of colour terms is the understanding of these internal relations. This is usually done by encouraging children to mix colours or to order them into rows and circles. We thus advance from the rather passive ability of identifying individual colours to the more active one of understanding colour relations. Wittgenstein emphasises this difference by using the example of chess: someone who does not know how to play chess but who recognises a chess board or two people playing chess has a different understanding of the word "chess" than someone who actually plays chess has. The two people will use the word "chess" in different ways.<sup>32</sup> As the analogy with chess is also useful for the understanding of what it is that colour-deficient people cannot learn about colour I shall elaborate on it:

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<sup>31</sup> For just as one needs to know the numbers 1-4 to learn the meaning of the number 3, one needs to know other colours to learn the concept of the colour red.

<sup>32</sup> See R.C. I,75; III,119,320 - this corresponds to the difference between someone merely able to count to three and someone who is able to multiply and divide by three, to know how three angles form a triangle, to know squares and squareroots of three, etc.

## 2.4. Colour Terms and Chess Pieces

The first thing that any chess player has to learn is to identify the individual chess pieces. Thus pawns, bishops, rooks or castles,<sup>33</sup> knights, the king and the queen each have to be correctly identified. And just as anyone with a colour-deficiency will identify most colours correctly but confuse others, someone "chess-deficient" might identify most chess pieces correctly but confuse king and queen, or bishop and pawn.

The second step, corresponding to the application of general colour samples (ch.IV, sect.2.3) is the identification of chess pieces on other chess boards, where the queen might be seated on a throne and the knight be mounted on a horse. Again the "chess-deficient" person might succeed with some pieces and not with others. Perhaps king and queen would be easier to distinguish from each other in a different set, but now rook and knight become problematic (much as some shades of green may be confused with blue and others with red or orange).

Both of these steps belong into the category of passive knowledge. Active understanding begins once we learn how each chess piece moves and how to checkmate the opponent. This corresponds to the learning of the colour circle including the notions of mixed and unmixed colours, and of colours being situated between other colours. While these concepts are easily spatially (hence quantitatively) definable their meaning can only be truly grasped once the basic colour terms are understood to *imply* these relations. Thus children might not at first know that red is a primary and orange a secondary colour, but they will learn and understand this once they have successfully mixed orange out of red and yellow but have failed to mix red out of other colours. After much colour mixing they will *see* that red is a pure colour while orange is mixed. Similarly, a chess player after much practice will *see* where the pieces can move to without being taken by the opponent and will no longer consider obviously foolish positions; just as a child will no longer consider mixing complementary colours such as red and green.

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<sup>33</sup> Differences in terminology are not usually a conceptual problem. Thus chess players may have to learn new terms if they move abroad, but that should no more affect their game than the fact that a cup is called "Tasse" in German will affect the taste of the coffee in it.

The grandmasters of colour are the artists. They no more reflect on the mixing and harmonic qualities of individual colours than a grandmaster of chess reflects on single movements. Instead they both see the whole picture (be it the whole painting or the whole chess board) and notice the slightest imbalance and how to use it to their advantage or how to avoid further disadvantage caused by movements of individual colours or pieces.

Given this analogy we can now see that a colour-deficient person can no more become an art-teacher than someone who cannot tell a pawn from a bishop can become a chess instructor.<sup>34</sup> Just as the chess-deficient community could however invent a new game of "chess•" in which pawn and bishop were no longer distinct but made the same moves, so colour-deficient people can paint quite wonderful pictures. But just as the pawn-cum-bishop is neither a true pawn nor a true bishop (even if it was defined thus) because the individual chess pieces only play the role they play in the complete set of chess pieces, so too the colour terms used by the colour-deficient community would have a different use from our colour terms even if some of them coincided with ours.

## 2.5. Conclusion

The ability to see all the colours of our colour space as distinct from and related to each other is an essential premiss for the learning of our colour terminology, which like other language games consists not merely of names but also of rules. Names and rules are intrinsically related because the meaning of individual terms is inseparable from their correct use. And just as chess pieces can only be used correctly if both the rules are known and the chess pieces correctly identified, so too colour terms can only be used correctly if both their relations are known and the individual colours recognised.

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<sup>34</sup> "I cannot teach someone a game which I cannot learn myself. Someone colour blind cannot teach the normal use of colour words to someone with normal vision. Is this true? He cannot *demonstrate* the game, the use."

"Ich kann niemand ein Spiel lehren, daß ich selbst nicht erlernen kann. Ein Farbenblinder kann den Normalsehenden nicht den normalen Gebrauch der Farbwörter lehren. Ist das wahr? Er kann ihm das Spiel, den Gebrauch nicht *vorführen*. (RCIII, 284)

This analogy also shows that the occurrence of colour blindness is not an argument for the subjectivity of colour: It is only because the pawn *is* different in shape from the bishop and because red *is* different from green that the difference between "normal" and "deficient" can be established. Colour vision and colour language are thus linked in the following way: Any colour space requires corner concepts in relation to which all other colours are determined. For the identification of a "dark bluish-green", for instance, we need to distinguish black (dark), blue and green from each other as well as from their contraries (white/light, yellow/orange and red). Someone who cannot distinguish one of the colours from some other colour will *necessarily* locate "dark bluish-green" in a different colour space.

So, although colour relations can in principle be expressed quantitatively (as in a paint shop where we mix 40% blue, 50% green and 10% black) they nevertheless rely on the recognition of a few irreducible colour qualities (red, green, blue, yellow, white and black). Anyone who cannot see one or more of these colours therefore necessarily fails to grasp all colour relations of hue, possibly saturation, and in a completely blind person even lightness. In logical terms one might say that the fundamental primaries are like axioms,<sup>35</sup> and lightness, brightness, saturation, additive and subtractive colour mixture, corresponding complementaries etc. are logical functions which can be performed on these axioms. Because the physical and phenomenal properties of individual colour pigments and lights differ from each other and may shift according to context, these functions may be applied quantitatively and in varying order to different axioms thus yielding different arguments/ colour spaces/ language games. Communication between these (between artists and scientists for instance) is only possible if the axioms are agreed on. But it is the axioms which the colour blind cannot grasp because they simply cannot see them. And this is why it is so difficult to discuss colour and colour relations with the colour-blind.

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<sup>35</sup> I compare the colours to axioms rather than to constants in order to show that each of them already contains certain relations; ie. that each colour term consists of both semantic and syntactic qualities. It does not follow from this simile that the colour terms could be conceptually analysed to yield these relations. One might rather regard them as potential relations whose use depends on individual contexts.

## COLOUR AND PAINTING

It remains a puzzle that a small two-dimensional surface with coloured patches can represent a vast landscape or a well known face. The possibility of painting seems to rest on the assumption that the real and the painted scene or object have something in common which we recognise in both. In this chapter I do not discuss what it is that painting and reality have in common.<sup>1</sup> Instead I wish to introduce four aspects of painting which can be found in the following quotation from Goethe's *Farbenlehre*.

"Since colour occupies so important a place in the series of elementary phenomena, filling as it does the limited circle assigned to it with fullest variety, we shall not be surprised to find that its effects are at all times decided and significant, and that they are immediately associated with the emotions of the mind. We shall not be surprised to find that these appearances presented singly, are specific, in combination they may produce an harmonious, characteristic, often even an inharmonious effect on the eye, by means of which they act on the mind; producing this impression in their most general elementary character, without relation to the nature of form of the object on whose surface they are apparent. Hence, colour considered as an element of art, may be made subservient to the highest aesthetical ends."<sup>2</sup>

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<sup>1</sup> Whatever the painting and the real scene or object have in common could be something internal to us (so that two external stimuli cause the same internal representation - be it visual as in sense-data theories or more abstract as in language-of-thought theories; Schopenhauer uses this explanation in *WWVII*, §36); but it is just as plausible that there is something external to us which the two have in common (such as a common distribution of colours), or that it is a combination of both (as in relational theories). Hence the fact that painting and the painted must have something in common does not in itself decide any issues in the philosophy of perception.

<sup>2</sup> "Da die Farbe in der Reihe der uranfänglichen Naturerscheinungen einen so hohen Platz behauptet, indem sie den ihr angewiesenen einfachen Kreis mit entschiedener Mannigfaltigkeit ausfüllt, so werden wir uns nicht wundern, wenn wir erfahren, daß sie auf den Sinn des Auges, dem sie vorzüglich zugeeignet ist, und durch dessen Vermittelung auf das Gemüt in ihren allgemeinsten elementaren Erscheinungen ohne Bezug auf die Beschaffenheit oder Form eines Materials, an dessen Oberfläche wir sie gewahr werden, einzeln eine spezifische, in Zusammenstellung eine teils harmonische, teils charakteristische, oft auch unharmonische, immer aber eine entschiedene und bedeutende Wirkung hervorbringe, die sich unmittelbar an das Sittliche anschließt. Deshalb denn die Farbe, als ein Element der Kunst betrachtet, zu den höchsten ästhetischen Zwecken mitwirkend genutzt werden kann."

*Zur Farbenlehre*, §758, trsl. Eastlake.

This passage raises the following four issues:

1. The representational aspect of painting: Technically, the possibility of painting is due to the "fullest variety" of colour within a limited circle, and to the internal link of colour with other aspects of nature.<sup>3</sup> Thus the manifold polarities of the colour space which I described in chapter VIII can be used to *represent* the manifold polarities in nature as a whole, from simple geometrical properties, such as shape and distance, to the representation of light and people.

2. The expressive nature of colour: Spiritual and emotional feelings can be *expressed* through colour because the effects of colour are "immediately associated with the emotions of the mind". While there has been some argument as to which colours arouse which emotions there are a few strong effects which we are as unable to escape as illusions such as the Müller-Lyer diagram. The expressive qualities of colour are aimed at the subject, and among other things they explain how abstract painting can affect us emotionally.

3. Colour harmony: The specific effects of individual colours can be combined with effects of other colours to form harmonies or disharmonies. *Colour harmony* transcends the purely physical effects of individual colours and is the aspect of painting most closely related to music.

4. The spiritual in art: The effects of individual colours and colour combinations are independent of the objects the colours are colours of. This not only explains the possibility of abstract art but also explains multilayered and possibly conflicting layers of meaning in one painting: form or object may tend towards one interpretation<sup>4</sup> while the colour tends towards another. So the *overall composition* in

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<sup>3</sup> The basic links are given in Goethe's table in the section "Internal relations" (Fl.§696): On the active (plus) side there are: yellow, effect, light, lightness, force, warmth, proximity, repelling, relation to acids (Gelb, Wirkung, Licht, Hell, Kraft, Wärme, Nähe, Abstoßen, Verwandtschaft mit Säuren); and on the passive (minus) side: blue, loss, shade, darkness, weakness, coldness, distance, attraction, relation to alkalines (Blau, Beraubung, Schatten, Dunkel, Schwäche, Kälte, Ferne, Anziehen, Verwandtschaft mit Alkalien). Hegel and Schelling use the links between colour and other aspects of nature to make sense of colour within their systems as complete explanations of nature; in Schopenhauer's philosophy colour is one way of the Will objectifying itself and hence a partial expression of nature (see ch.V, sect.5). Indeed we use colours as signifiers of other aspects of nature: redness for instance, can be meteorologically significant, can tell us whether fruit are ripe, and can above all disclose human emotions. In painting colour can therefore be used to represent, symbolise or point to qualities which are themselves invisible.

<sup>4</sup> I use the terms "meaning" and "interpretation" on the one hand and "emotion" on the other because I believe that both immediate and intellectual effects are combined in painting, albeit to a different degree in

painting needs to take the above three points into account and combine them with effects from geometrical elements and overall content to achieve communication of subjectivity and/or spirituality.

At the end of this chapter it should be clear how painting can transcend the material of canvas and paint and become the expression of something non-material. I take this to be a strong argument for the irreducibility of all qualitative aspects of colour.

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different paintings. In how far these effects are learnt and in how far they are universal is an empirical matter which I wish to leave open.

## 1. Painting as Representation

"[Painting] uses as material for its content and its formation *visibility* as such, in as far as it [visibility] simultaneously *particularises* itself, i.e. determines itself in colour."<sup>5</sup>

The technical possibility of painting rests on the characteristics of colour alone, as colour is the one essential material used in painting.<sup>6</sup> I shall first briefly look at what distinguishes painting from other visual arts and then discuss two aspects of representational painting in greater detail, namely its representation of three-dimensionality and light.

More than any other art form painting depends on light and visibility. Painting is "*visibility set in itself as subjectified and ideal*".<sup>7</sup> Several art forms rely on visibility (the "visual arts"): Painting, sculpture and architecture all require external light sources as well as observers with reasonably good eyesight (they cannot be appreciated as much (if at all) in the dark or by blind people), but painting is unique in that it also requires an internal light source to light up the scene within the painting.<sup>8</sup> This *making visible* ("Sichtbarmachen") of the scene in a painting takes three stages, the first two of which painting has in common with other two-dimensional art forms such as drawing and print, but the third of which is particular to painting alone.<sup>9</sup>

First, there is the line or outline, which distinguishes figure from background.<sup>10</sup> The silhouettes of the 18th and 19th century are one example of how outlines alone can

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<sup>5</sup> "[Die Malerei] gebraucht zum Material für ihren Inhalt und dessen Gestaltung die *Sichtbarkeit* als solche, insofern sich diese zugleich *partikularisiert*, d.h. sich zur Farbe fortbestimmt." (Aesth., Einteilung, 3a; vol.I,p.120; my italics)

<sup>6</sup> Note that the German word "Farbe" means both "colour" and "paint".

<sup>7</sup> "in sich *subjektivierte und ideell gesetzte Sichtbarkeit* (ibid.)

<sup>8</sup> Photography and film also require both external and internal light sources, but Hegel was obviously not aware of these art forms. Although it might be interesting to include a section on colour film and colour photography I shall exclude these media for the sake of brevity.

<sup>9</sup> The division into drawing, chiaroscuro ("Hell-Dunkel") and coloured painting is common to Goethe (Fl."Ästhetische Wirkung", §§ 848-910), Hegel (Aesth., Part III, 3, 1b & 2b), and Schelling (PhK §87, I/5 pp.519-542).

<sup>10</sup> In Hegelian terms this is light-in-itself as "the general making visible of objectivity" simultaneously manifesting the surface (objective matter) and itself (subjective ideality) on the surface. The particularisation of this light-dark opposition is the visible borderline between light and dark such as in outlines. Particularisation

represent single figures, ie. pick out the particular from the general. Other examples are cave drawings, stickmen, woodcuts and lithography, hieroglyphs and all modern forms of writing. In all of these the colour of the line is irrelevant as long as it differs sufficiently from the background to be clearly discernible. Thus figure and background can change or exchange colour without change of meaning, for the meaning of the outline (as the example of writing shows) is purely referential.<sup>11</sup>

The second stage in the development of painting is not to strictly separate light from darkness but to let them inter-play<sup>12</sup> in the art form, which Goethe and Hegel call "light-dark" ("Hell-Dunkel") and art historians call "chiaroscuro". It allows for softer modelling than line drawings or prints do, and hence for more naturalistic representation, but it still essentially distinguishes figure from background merely through differences in lightness, so that the particular colours (hues) of figure and background remain insignificant.

In the third stage, which finally distinguishes painting from drawing and other monochrome art forms, light and dark no longer co-exist side by side. When their inter-play becomes truly internal, genuine unity is achieved in colour:

"For the light, as we have seen, refers to its other, the dark. In this relation both principles, however, do not remain independent, but set themselves as unity, as the within-each-other of light and dark. The in itself made turbid, darkened light, which yet penetrates and lights up the dark is the principle of *colour* as the true material for painting."<sup>13</sup>

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is an important notion for Hegel's understanding of the Romantic art forms. To him, classical art forms and especially Greek sculpture demonstrate absolute beauty in abstract bodies, while the Romantic art forms and especially painting show the inner spirit of humanity in the features of one particular person. (see also below sect.4).

<sup>11</sup> There are two exceptions: symbolic use of colour and colour as means of disambiguation - see section 1.2.

<sup>12</sup> "Ineinanderspielen" - (Hegel, Aesth., Part3,III,1,1 b) Das sinnliche Material der Malerei, beta, double gamma, vol.III, p.33).

<sup>13</sup> "Das Licht nämlich, wie wir bereits sahen, bezieht sich auf das ihm Andere, das Dunkle. In diesem Verhältnis bleiben jedoch beide Prinzipien nicht etwa selbstständig, sondern setzen sich als Einheit, als Ineinander von Licht und Dunkel. Das in dieser Weise in sich selbst getrübte, verdunkelte Licht, das aber ebenso das Dunkle durchdringt und durchleuchtet, gibt das Prinzip für die *Farbe* als eigentliches Material der Malerei. (ibid.)

In the following two subsections I shall look at colour as material for representation. The definition of colour as "within-each-other of light and dark" is useful but not necessary for the understanding of the representation of light in painting. Subsection 1.2. shows how a different quality of colour can be used to enhance or undermine three-dimensional effects.

### 1.1. Light in Painting

In order to understand the representation of light in painting we have to distinguish between the painting as a physical object of our perception and the painting as a represented world. Each of these can be further divided (Walter Schöne, for instance, uses altogether six categories).<sup>14</sup> I shall concentrate on the represented world, or "picture world" as I shall call it. As I wrote in chapter VI, we see illumination and light sources only in the form of light pictures. The same is true for any scene within a painting. Thus we only see the illumination of the picture world by inference from the objects in the scene. A brightly coloured scene, for instance, in which we can clearly discern all of its objects is a scene well illuminated. It is important to note that this painted illumination depends entirely on circumstances within the picture world: a picture room gets dark if its light is extinguished, and a sunny landscape no longer looks bright after nightfall or on a rainy day. External illumination, such as the lights in a gallery have no influence on this picture light.

Internal light sources may but need not be depicted within the picture. Again, the same rules apply as in our usual surroundings: the light source itself can only be

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<sup>14</sup> Schöne's categories are the following:

1. Intrinsic Light ("Eigenlicht"): the lightness intrinsic to each colour.
2. Illumination ("Beleuchtungslicht"): the illumination represented in the picture.
3. Sending Light ("Sendelicht"): light transmitted ("sent") from the picture to the viewer.
4. Pointing Light ("Zeiglicht"): points to figures within the painting.
5. Painting Light ("Bildlicht"): A rather strange concept by which Schöne seems to mean the overall light in a painting.
6. Standpoint light ("Standortlicht"): the lighting condition under which a painting is seen. Viewing conditions quite obviously influence the effect of paintings but I shall not discuss them any further since they are a practical matter for curators of galleries, rather than a philosophical issue. (Walter Schöne, *Über das Licht in der Malerei*, 1979).

seen if it is relatively dark (a hermit's candle, the moon, a setting sun). Bright light sources, such as the midday sun, can only be inferred by bright illumination, i.e. by the objects being depicted in bright colours. We cannot paint bright light sources because there simply is no colour to depict them: once all the brightly illuminated objects with their reflective surfaces are painted in the brightest colours, there are no colours left to depict an even brighter light source.

Painting the light source in the picture world is as little necessary for the depiction of illumination as seeing a real light source is necessary for judging illumination in the real world. Light sources and illumination can, however, be painted if they are relatively dark and thus appear as light-pictures. Typical examples are not just the candle, the moon or the sunset mentioned above, but also light-beams. As all light-pictures have to be represented using the brightest colours in the painting, they will invariably draw our attention to them. They thus become artistic pointers to the most important part(s) of the painting (Schöne aptly calls them "pointing lights"). The most obvious examples of pointing lights in Western Art are light rays around a holy figure. When there is no such figure, but we see light rays streaming from the clouds, these can by extension refer to God Himself.

The only means of representing light sources, illumination and higher ideals in painting is the distribution of colour on the canvas.<sup>15</sup> We use the intrinsic light of colour pigments in order to represent light. Each colour has its own intrinsic lightness value (see ch.VIII), which can, however, vary depending on the colour context it is seen in (a light blue, for instance, will look dark beside a bright pink but light beside dark blue), so that it is the overall lightness of a painting which determines how bright its highlights are to be. Many artists therefore begin with a white or a black foundation, adding lighter or darker colours respectively to achieve the correct gradations of lightness. Leaving diverging artistic techniques aside, the representation of light is necessarily achieved by the lightest points in the painting which hence draw our

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<sup>15</sup> "In painting on the other hand, the in itself dark matter has within itself its [own] inner, ideal, the light; it is in itself lit and the light for the very same reason darkened. But this unity and the forming in one of light and dark is colour." - "In der Malerei dagegen hat die in sich selbst dunkle Materie in sich selbst ihr Inneres, Ideelles, das Licht; sie ist in sich selbst durchleuchtet und das Licht ebendeswegen in sich selbst verdunkelt. Die Einheit aber und Ineinsbildung des Lichts und Dunkels ist die Farbe." (Hegel, Aesth., Part3, Einteilung, vol.II, p.260)

attention to them - especially if the overall illumination in the painting is quite weak. (Think of the Dutch masters, for instance, where a cheek or nose reflecting some light source (which is not itself represented) captures our immediate attention.)

The painting as physical object hence transmits its message to the viewer in areas of lightness which point to its central theme or character; this may only much later be recognised or grasped intellectually. Intrinsic lightness of colour is thus sufficient as *material* for the communication of messages, although like all other forms of raw material it requires to be worked into shape by the artist.

## 1.2. Dimensionality

The representation of a three-dimensional world on a two-dimensional canvas is the second outstanding aspect of painting compared to sculpture or architecture.<sup>16</sup> Arnheim<sup>17</sup> argues that, strictly speaking, we hardly ever see anything in two dimensions: we usually at least distinguish between figure and background. This claim is supported by figures such as the maltese cross which is not seen as eight segments in a circle but as a cross *over* a circle.

The Necker cube is a well known example of how we see something three-dimensionally which really just consists of eight lines on a page. Without going into further details I therefore assume that it is not only possible but relatively easy to represent three-dimensions on a two dimensional page. In this section I shall concentrate on the effect of colour on our three-dimensional vision.<sup>18</sup>

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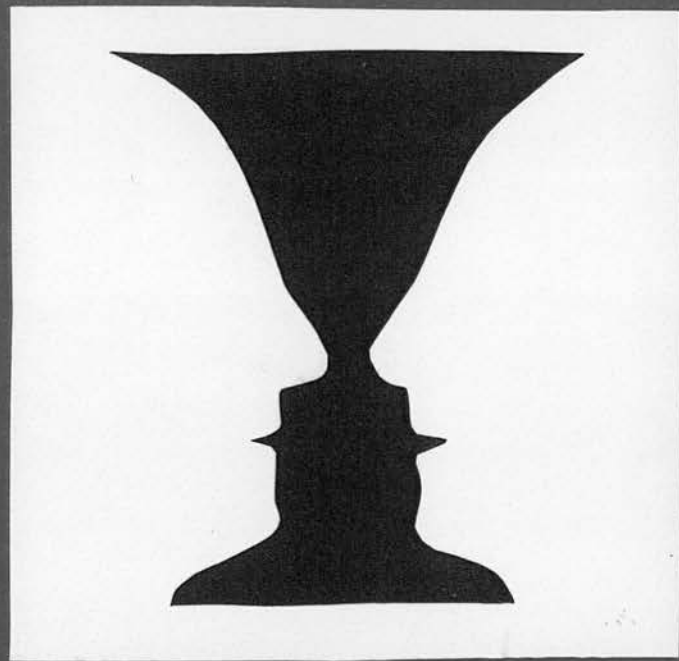
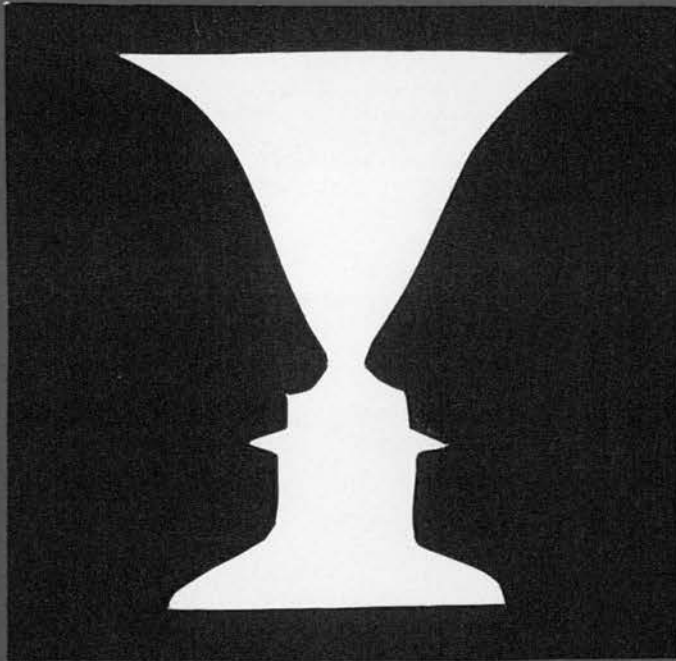
<sup>16</sup> Again, the same applies to film and photography, albeit by passive captivation rather than active construction.

<sup>17</sup> Rudolf Arnheim, *Kunst und Sehen*, 1978, pp.215-295.

<sup>18</sup> Painting requires the correct perspective (alpha) and form (beta), but (gamma) "its true (eigentlich) task is the colouring, so that in the truly painterly [picture] distance and form (Gestalt) only gain their true depiction in differences of colour." - "Denn ihre eigentliche Aufgabe ist die Färbung, so daß in dem wahrhaft Malerischen Entfernung und Gestalt nur durch Farbenunterschiede ihre eigentliche Darstellung gewinnen und darin aufgehen." (Hegel, *Aesth*, Part3, III, 1,2 b)β - vol.I,p.68).

### Rubin's Vase or Two Heads

On a middle grey background the white figures are slightly predominant over the black figures, an effect which increases the darker the background; on a lighter background, however, the black figures are seen more easily; also, some people see the vase rather than the heads in any combination of colours. Altogether the effect is weak but consistent.



In the introduction to this chapter I said that in simple drawings of an outline or a figure on a background the colours chosen are irrelevant to the interpretation of the picture. I now wish to qualify this statement: Although the particular colours chosen do not change the figure seen, they may influence the way we interpret it. Furthermore, colour can be used to disambiguate pictures. In the drawing of an "A", for instance, we can either see the letter on the page or we may see it as a letter cut out of a black piece of paper laid over the page.



In ambiguous pictures, where our interpretation of which part is figure and which part is background actually makes us see different objects (such as Rubin's vase or two heads - see previous page), that part is usually seen as figure which is surrounded ("A"), which is smaller (such as a corner of a picture), which is simpler (such as the figure of a man rather than a complex figure surrounding it), or which is in the lower half of the picture:<sup>19</sup>



Colours too make a difference. First of all, the more striking colour will more easily be seen as figure than as background. Thus a bright red will be seen as figure over a dull grey background, and not vice versa. Also, the warmth of the colour matters. Goethe attributes yellow-orange to proximity and blue to distance. A combination of these two colours therefore favours the yellow-orange figure on a blue background over a blue figure on a yellow-orange background.<sup>20</sup>

More complex spatial relations are represented using the geometrical art of perspective. That this has to be learnt can be seen in the beginnings of painting - both children and historically early artists do not use the laws of perspective (an invention

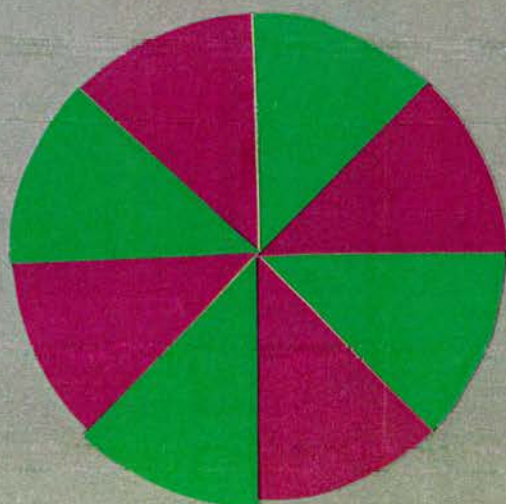
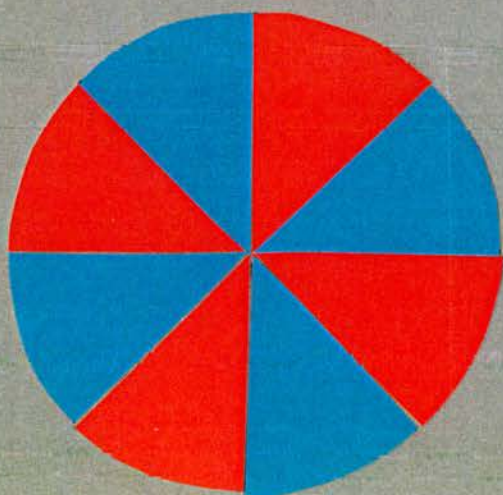
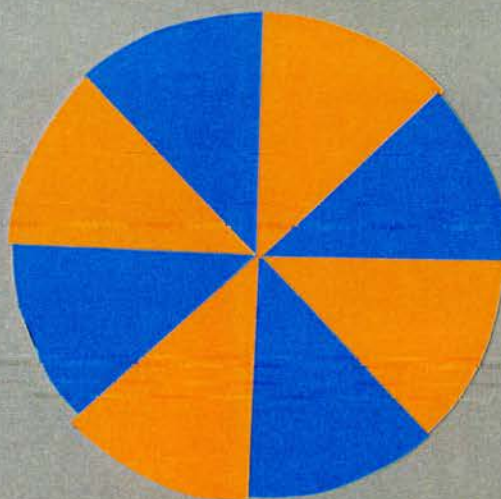
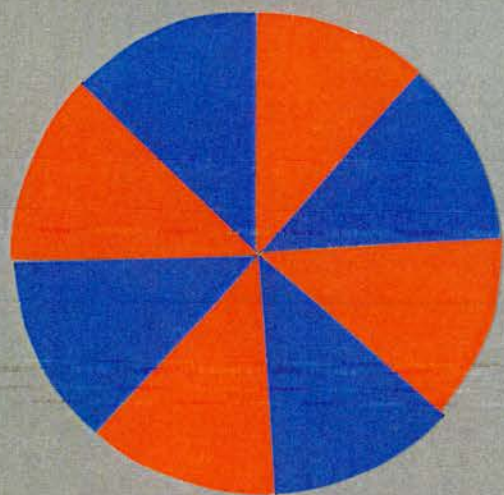
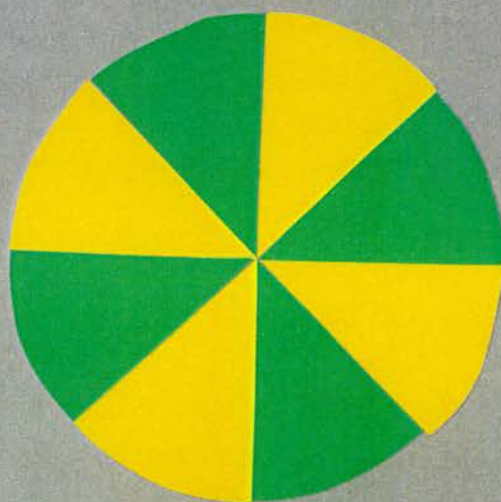
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<sup>19</sup> Arnheim, 1978, pp.225-6.

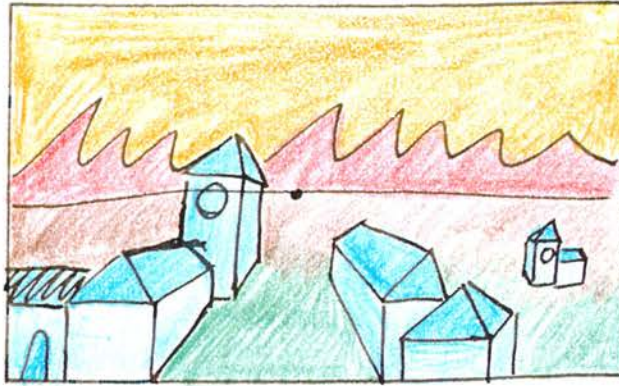
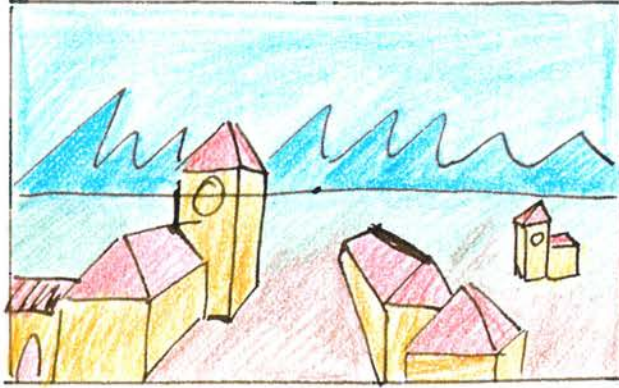
<sup>20</sup> See next page for illustrations - some of the results are not quite as clear as one might expect, but I think that over all the result is convincing enough.

## Crosses on Circles

To show which colours are usually seen as figure rather than as background I have chosen a neutral background (regarding lightness) and a neutral figure (i.e. one in which either colour will yield the same figure albeit with slight shift towards the right or left).

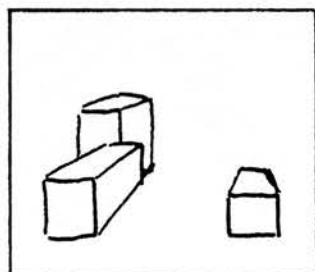


Receding and Approaching Colours

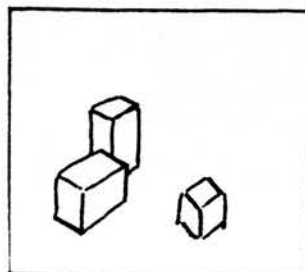


of the Renaissance). Arnheim makes the interesting observation that it is only anthropocentric Western artists who use the "central perspective". Chinese and Japanese paintings are traditionally "isometric": they show the objects in relation to themselves and to other objects rather than in relation to an individual viewpoint.<sup>21</sup>

Western Perspective



Isometric Perspective



Because both colour and perspective have irresistible visual effects they can be used either to emphasise or to undermine each other. The first effect is called "Luftperspektive" ("air perspective") and discussed by Goethe, Hegel and Schelling.<sup>22</sup> It essentially consists in giving far away objects a bluish colour. Goethe correctly observes that distant hills and mountains indeed have a bluish tint. In the strongly coloured sketches on the next page you can see a somehow caricatured but nevertheless working effect of perspective together with colour. In the first picture, we see a street with blue hills in the distance. In the second picture, however, these hills do not just look like red hills, but the appearance is that of a firestorm approaching the village. The difference is not merely that of hills retreating versus fire approaching, but also one of relative distance to the street.

The relation between colour and representation is of course more complex than this. In addition to general effects of contrast and distance, there are aesthetic and emotional effects as treated in the next section, as well as psychological effects of association, which may vary in different sociological groups or even from person to

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<sup>21</sup> Arnheim, 1978, pp.278, 287.

<sup>22</sup> Goethe: Fl.§§867-870, 872. Hegel: Aesth.Part3,III,1,2b,Γ,ββ - vol.I, pp.77-8. Schelling: PhK I/5,pp.532, 545.

person. What I tried to show in this section, is that the intrinsic qualities of lightness and hue particular to each colour can be used for the representation of light, figures and perspective.

## 2. Colours affecting our Gemüt: Expression through Colour

I shall now look at the effects individual colours have on us independently of their representative roles. While colours share with grey the property of being a unity of light and dark,<sup>23</sup> only colours are a *specific* unity of light and dark:<sup>24</sup> they may have the same lightness as each other and as some grey shade but they are still differentiated within themselves (they form an extra dimension in the colour space). The primary colours in particular are "the colour differentiations necessary to and lying in the essence of colour itself"<sup>25</sup>.

Each colour has its own particular effects. These may be modified if mixed with light or dark (white or black) or with another colour but will still be detectable in the mixture. However, different artists have associated different qualities with individual colours.<sup>26</sup> Different Bauhaus artists, for instance, were of different convictions as to which colours were associated with which geometrical forms.<sup>27</sup> Different colours have also been associated with male and female principles,<sup>28</sup> and all colours have had varying symbolical and allegorical uses.

Yet there are a few qualities which everyone agrees on, and these are largely given in Goethe's *Farbenlehre*.<sup>29</sup> Goethe argues that the aesthetic characteristics of

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<sup>23</sup> Hegel, *Aesth.*, Part3,III,1,2b Γ,αα - vol.III, pp.70-72.

<sup>24</sup> See Hegel in a passage on the concept (Begriff) of "blue" - (*Aesth.*, Part1,I,1,1 - vol.I, p.147).

<sup>25</sup> "die im Wesen der Farbe selbst liegenden notwendigen Farbenunterschiede" (Hegel, *Aesth.*, Part1,I,2,B,1c - vol.I, p.187).

<sup>26</sup> Gage, *Colour and Culture*, 1995.

<sup>27</sup> Kandinsky, Klee and Itten thought that the triangle was linked to yellow, the square to red and the circle to blue; Schlemmer and Hoeltzel on the other hand, thought that the circle was red and the square blue. (Gage, pp.261-2; also Kandinsky, *Punkt und Linie zur Fläche*, p.80)

<sup>28</sup> Runge, 1810: blue-violet female, and yellow-orange male (Gage,p.190);  
F.Marc, 1910: yellow female, blue male (Gage, p.207);  
Mondrian, 1914: red female, green male (Gage, p.248);  
Kandinsky, 1920's: blue female, yellow male (Gage, p.293, note 113).

<sup>29</sup> *Farbenlehre* ch. VI: "Aesthetic-Moral Effects of Colour ("Sinnlich-Sittliche Wirkung der Farbe"; §§ 758-920, especially §§765-802)

individual colours are related to their roles in physical phenomena.<sup>30</sup> Yellow, for instance, is naturally close to light and therefore shares with light the predominantly active effect of a lively, if not intruding, closeness to the observer. Blue on the other hand shares with darkness the receding and hence enticing mystical characteristics - it appears to be far away and therefore makes us long for it. Red is the most energetic augmentation of both and can thus be positively majestic but also overpowering, whereas green - the balance between yellow and blue - is calming, if not boring.

These effects can of course be combined. Goethe divides all colour combinations into characteristic and non-characteristic ones. He uses these terms in two different ways, which are further elaborated by Albers and Arnheim respectively. The first sense of "characteristic combination" refers to a general tendency of the colours used to either the active or the passive side.<sup>31</sup> An emphasis on the active side (yellow, red and reddish-purple) leads to a "mighty" ("mächtig") effect, while a predominant use of colours on the passive side (blue, green and bluish-purple) achieves a "gentle" or "soft" ("sanft") effect. Josef Albers<sup>32</sup> captures the first two of Goethe's combinations under the headings "mighty" and "melancholic", but also adds "lucid", "serious" and "serene" combinations (see next page).

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Hegel largely agrees with Goethe's characterisations (Aesth., Part3,III,1,2c (vol.III, pp.73-75). Schelling and Schopenhauer do not give details about the use of particular colours. Wittgenstein appears to disagree with the association of colours with particular effects, because effects are always context dependent (see also sect.3.3)

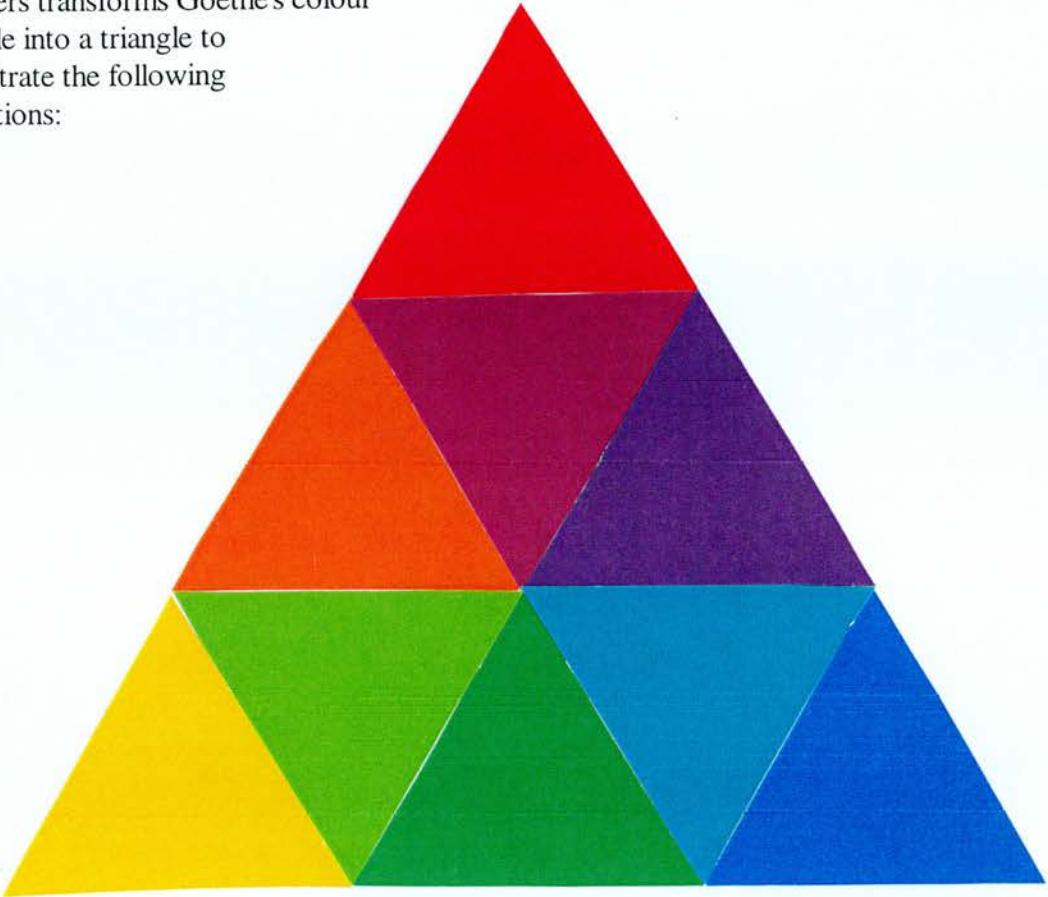
<sup>30</sup> See also Schelling: "Goethe's new views of his Lehre are founded equally on the effects of colour in nature and in art; one can see in them the innermost harmony between nature and art..."

"Goethe's neue Ansichten dieser Lehre sind ebenso auf die Natur- als auf die Kunstwirkungen der Farben gegründet; man sieht in ihnen die innigste Harmonie zwischen Natur und Kunst..." (PhdK, I/5,510)

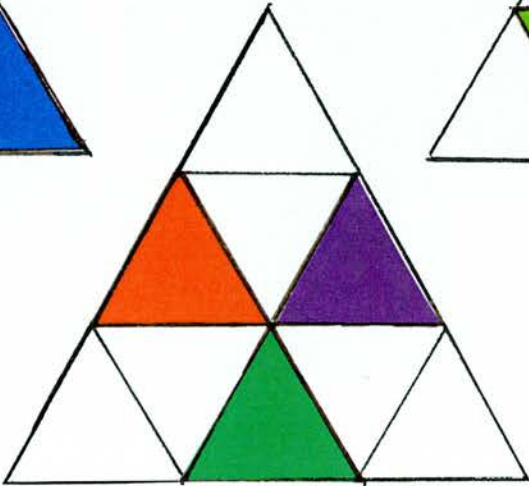
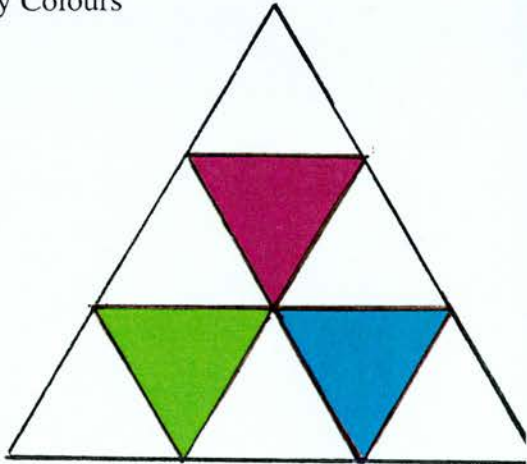
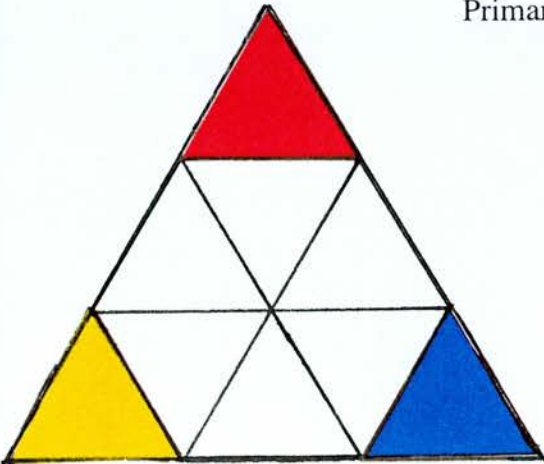
<sup>31</sup> Fl. §§880-884.

<sup>32</sup> *Interaction of Color*, 1975.

Albers transforms Goethe's colour circle into a triangle to illustrate the following relations:

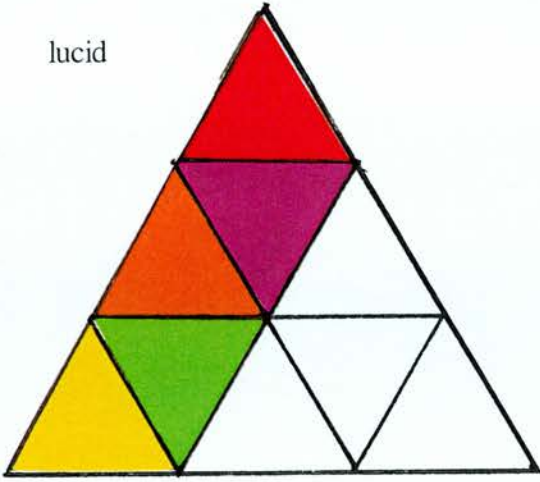


Primary, Secondary and Tertiary Colours

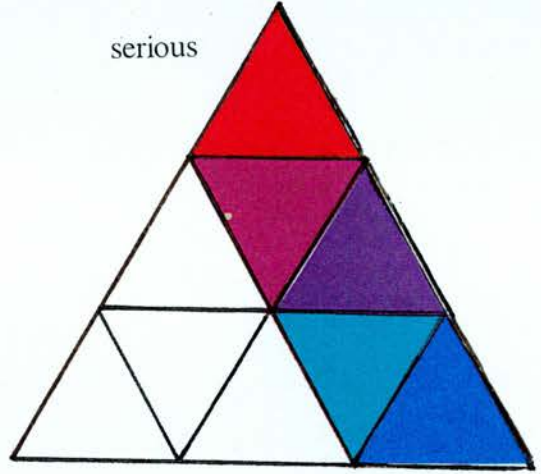


Albers associates the following characteristics with these colours:<sup>33</sup>

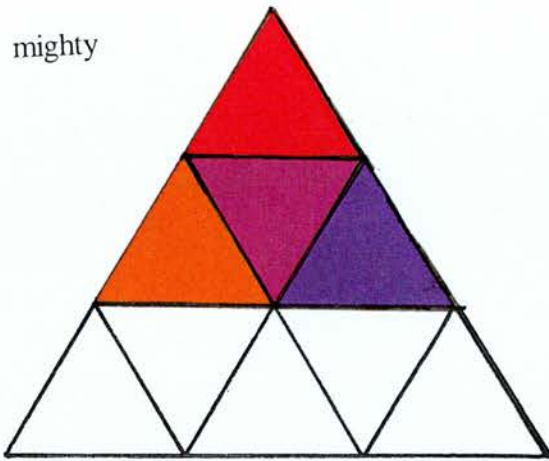
lucid



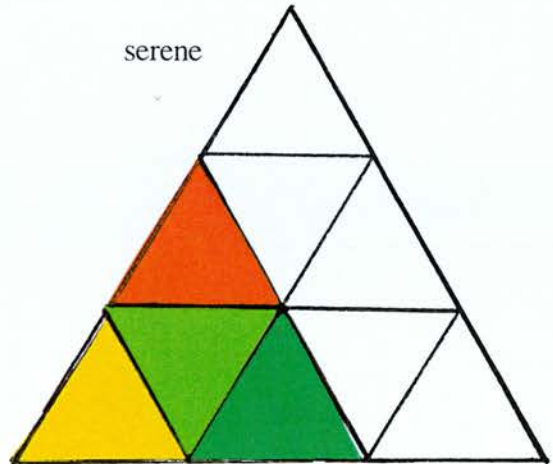
serious



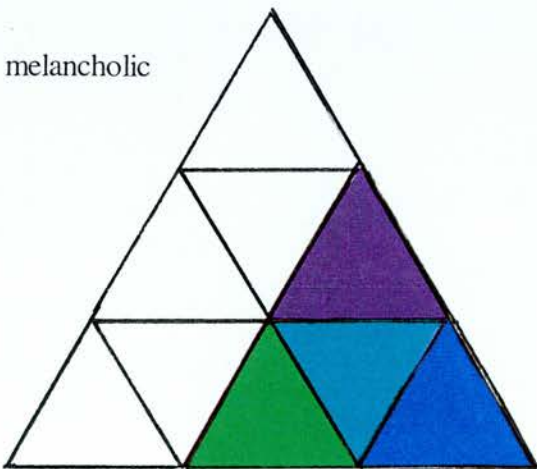
mighty



serene



melancholic



<sup>33</sup> Josef Albers, *Interaction of Color*, 1975, p.67.

Colour combinations which belong not just to one side of the colour circle can be characteristic or non-characteristic in the second sense. Goethe argues that a relatively long distance between two colours leads to characteristic combinations, while colours which are relatively close to each other combine in non-characteristic combinations.<sup>34</sup> Arnheim offers a more detailed analysis of colour combinations and their effects on us.<sup>35</sup> The idea is that most colour mixtures consist of a dominant and a subordinate primary colour (red, blue and yellow), as can be seen in expressions like "reddish blue" versus "bluish red". (For the sake of simplicity I shall leave aside mixtures with black and white).

The following six colour plates illustrate the effects of various colour combinations depending on their dominant and subordinate elements. The rules according to which colour combinations are pleasing (attract each other) or non-pleasing (repel each other) are perhaps not as simple as one might expect, but they are consistent and the examples are convincing.

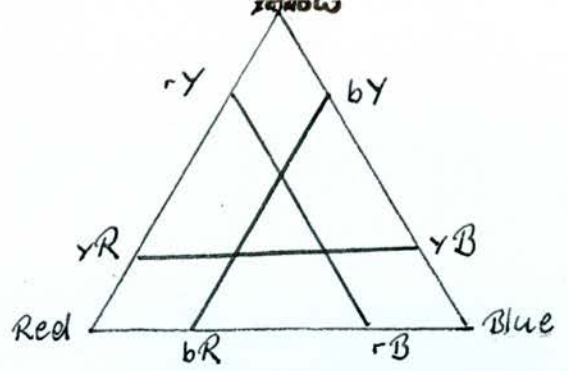
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<sup>34</sup> According to Goethe, characteristic combinations are: yellow & blue, yellow & red ("Purpur"), blue and red ("Purpur"), and orange and purple ("Blaurot"), which mix subtractively to yield green, orange, purple ("Blaurot") and red ("Purpur") - (Fl. §§816-825). Please note that Goethe's use of colour terms denoting red shades is inconsistent throughout the *Farbenlehre*, so that my translation is a sensible application of Goethe's thought to the colour circle rather than a literal translation (see also Matthai, 1947).

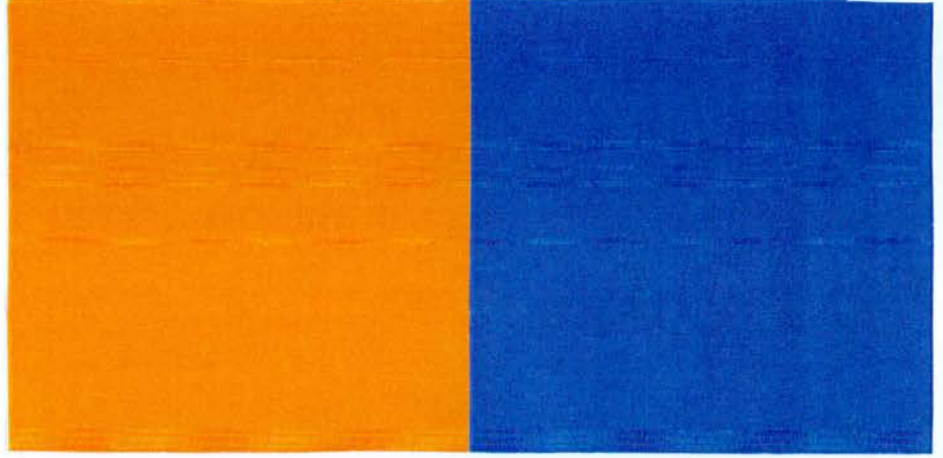
<sup>35</sup> Arnheim, pp.351-354

1. Common Subordinate: Attraction

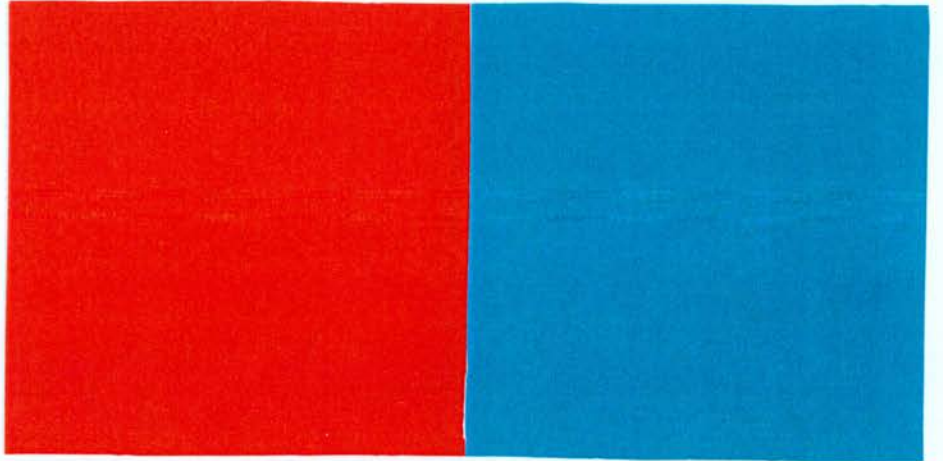
When two colours contain a small amount of the same primary colour they connect well with each other.<sup>36</sup>



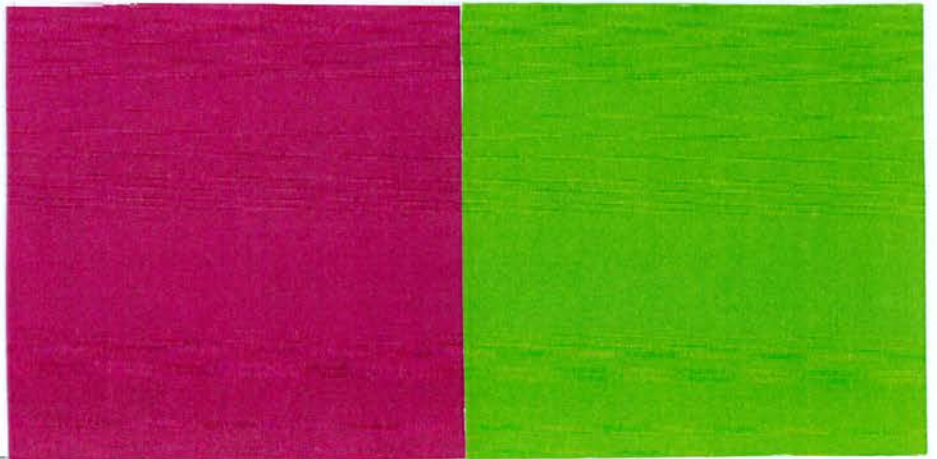
red-YELLOW &  
red- BLUE



yellow-RED &  
yellow BLUE

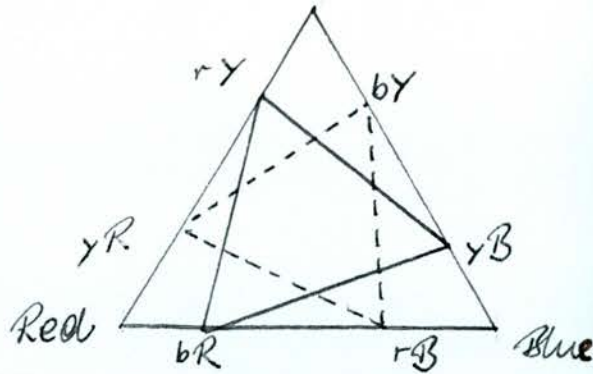


blue-RED &  
blue YELLOW

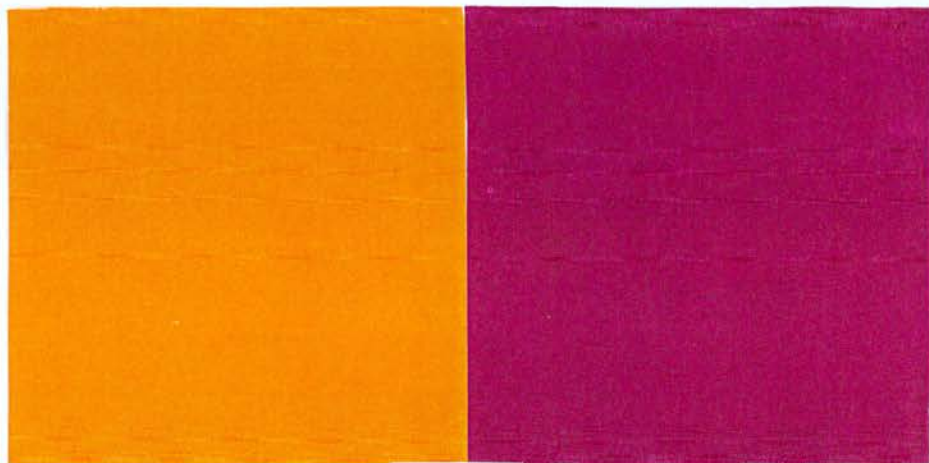


<sup>36</sup> In this and the following examples I use capital letters for the dominant element in the mixture. Please note that the examples on this and the following pages are best viewed individually.

2. Structural opposition with common element: Repulsion  
 Each pair has a colour in common, which is however, dominant in one and subordinate in the other, leading to unpleasant asymmetry.



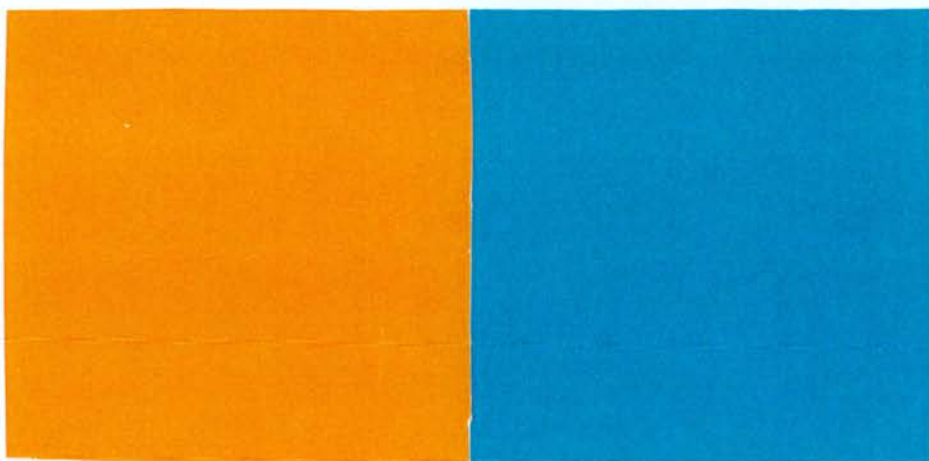
red-YELLOW &  
 blue-RED



yellow-RED &  
 red-BLUE



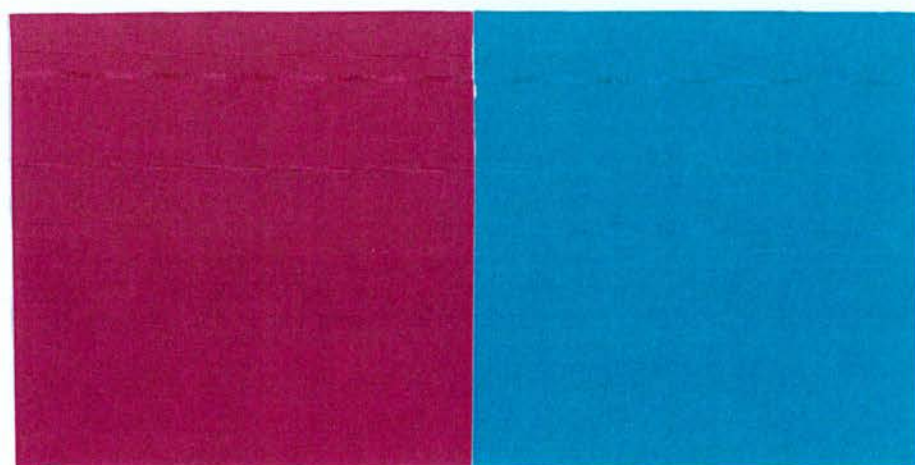
red-YELLOW &  
 yellow-BLUE



blue-YELLOW &  
 yellow-RED



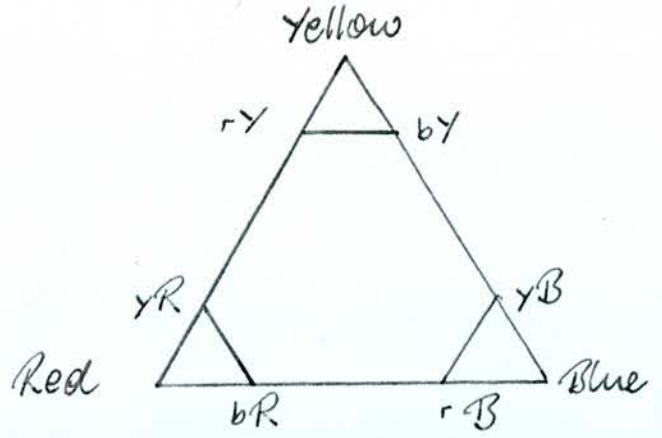
blue-RED &  
 yellow-BLUE



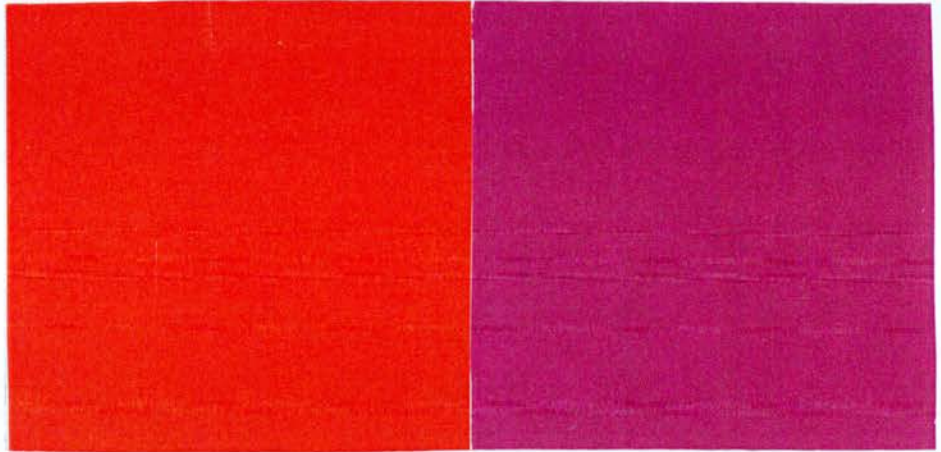
blue-YELLOW &  
 red-BLUE



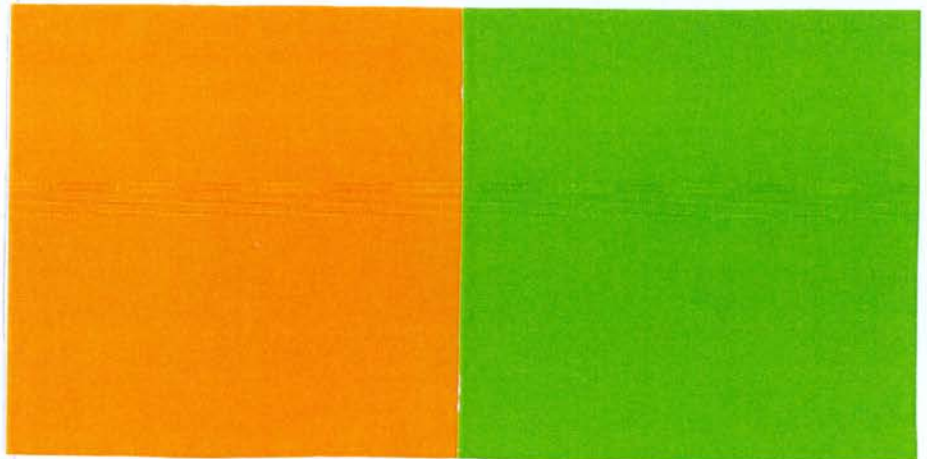
3. Common Dominant: Repulsion  
 When two colours contain large amounts of the same colour, they emphasise the difference between each other - they repel each other.



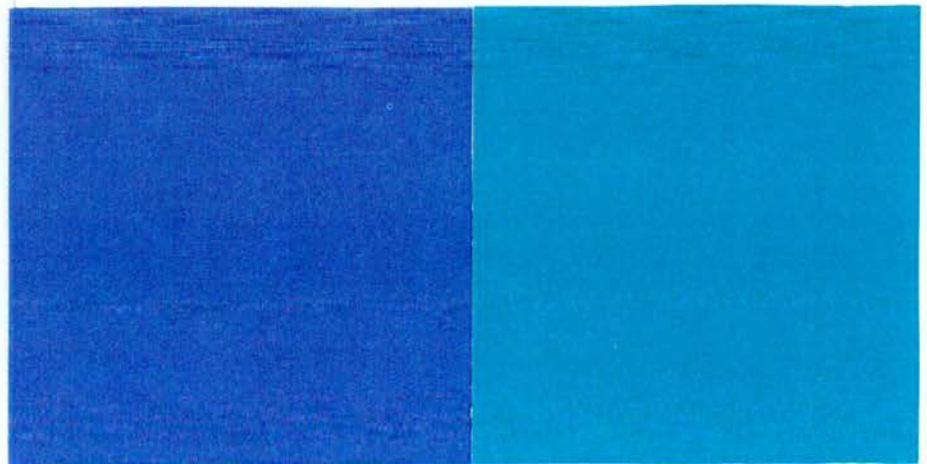
yellow-RED &  
 blue-RED



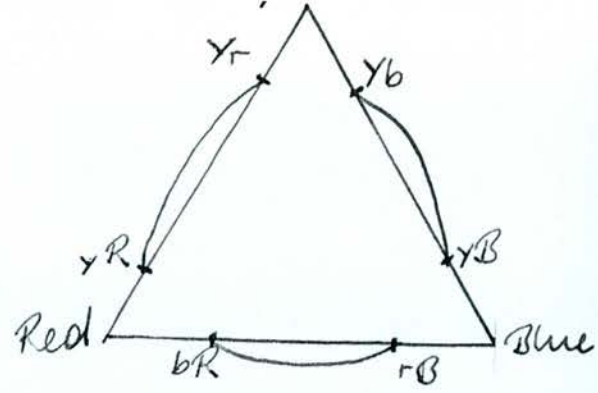
red-YELLOW &  
 blue-YELLOW



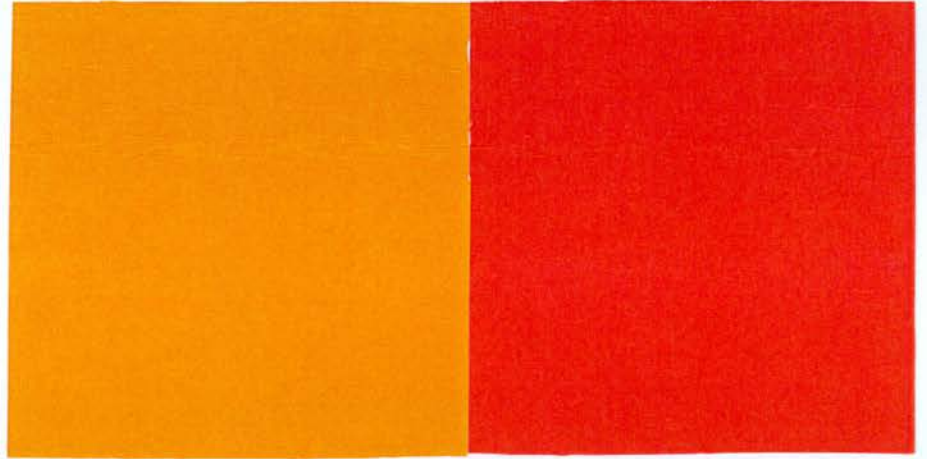
red BLUE &  
 yellow-BLUE



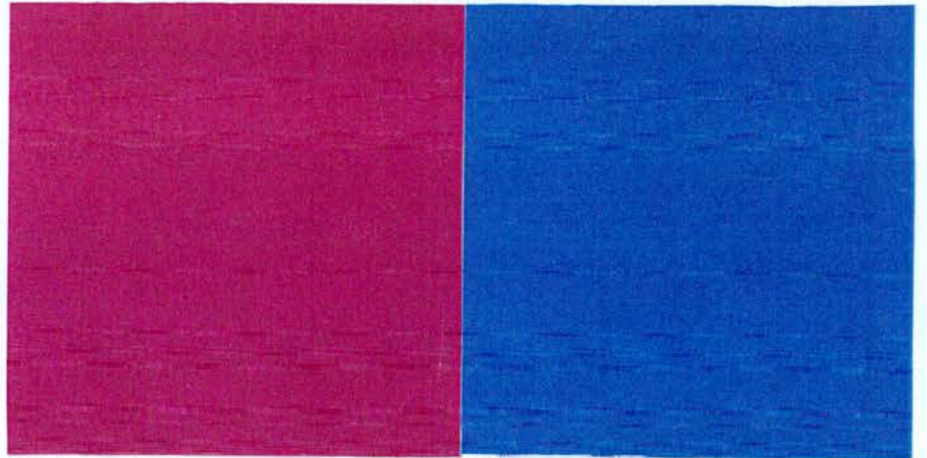
4. Structural Inversion: Attraction:  
A combination of two colours with  
the same components but reversed  
dominance leads to pleasant  
(because symmetrical)  
combinations.



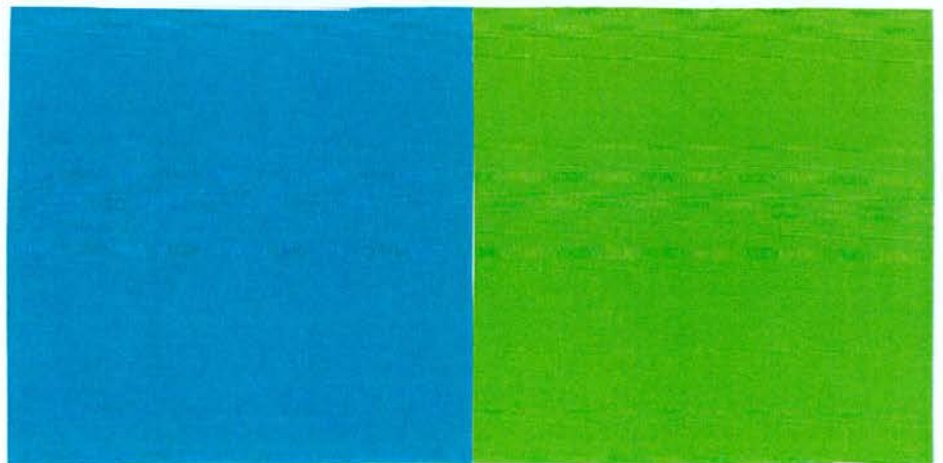
red-YELLOW &  
yellow-RED



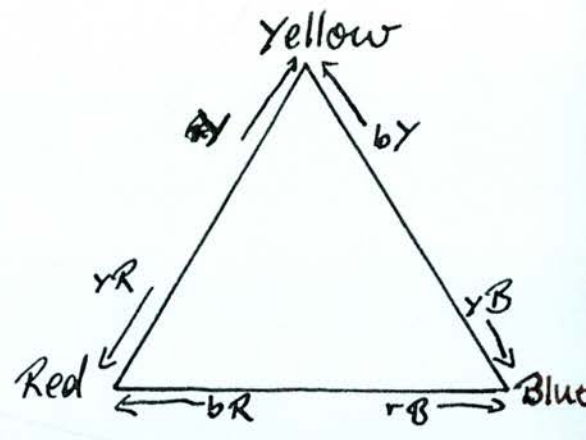
blue-RED &  
red-BLUE



yellow-BLUE &  
blue-YELLOW

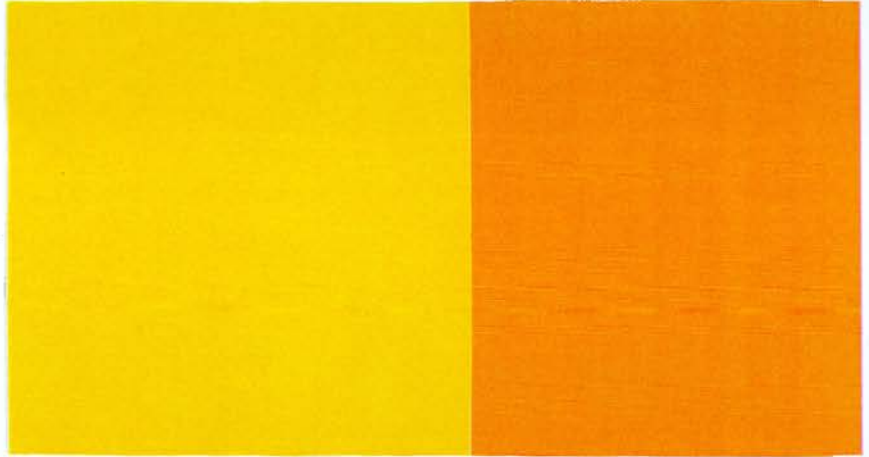


5. Pure primary and primary dominant:  
 Repulsion  
 The asymmetry between a pure primary colour and a mixture with that primary colour is repellent because it emphasises the deviation from the primary.



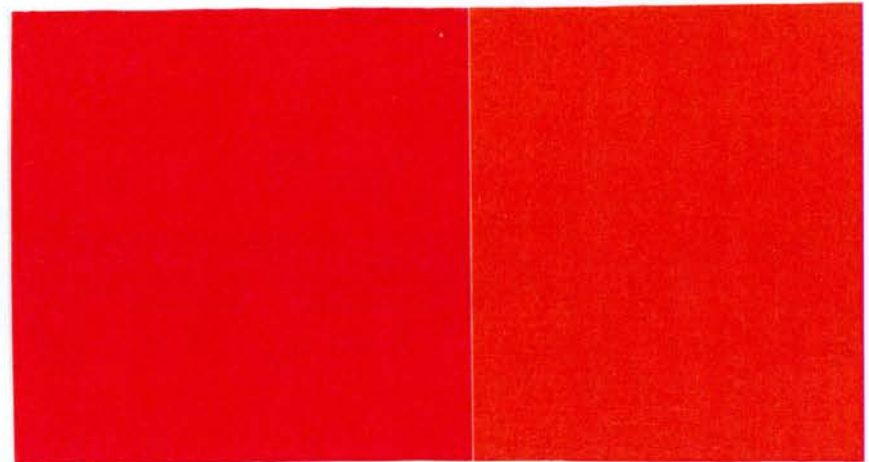
YELLOW & red-YELLOW

YELLOW & blue-YELLOW



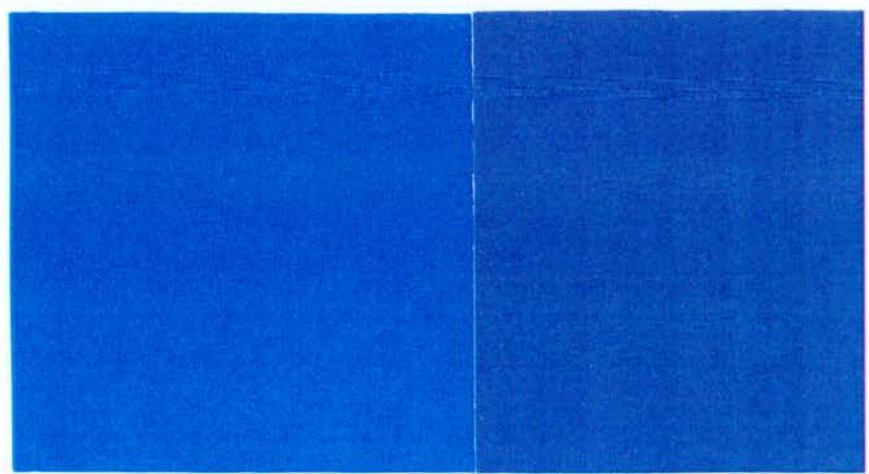
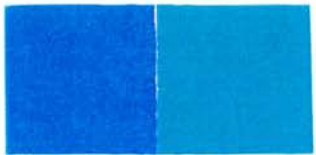
RED & yellow-RED

RED & blue-RED

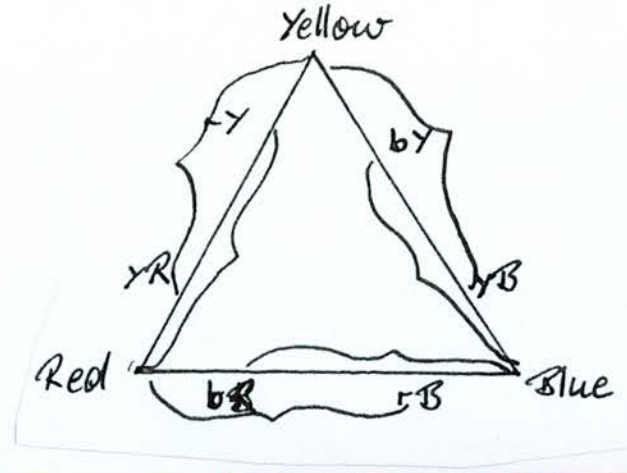


BLUE & red-BLUE

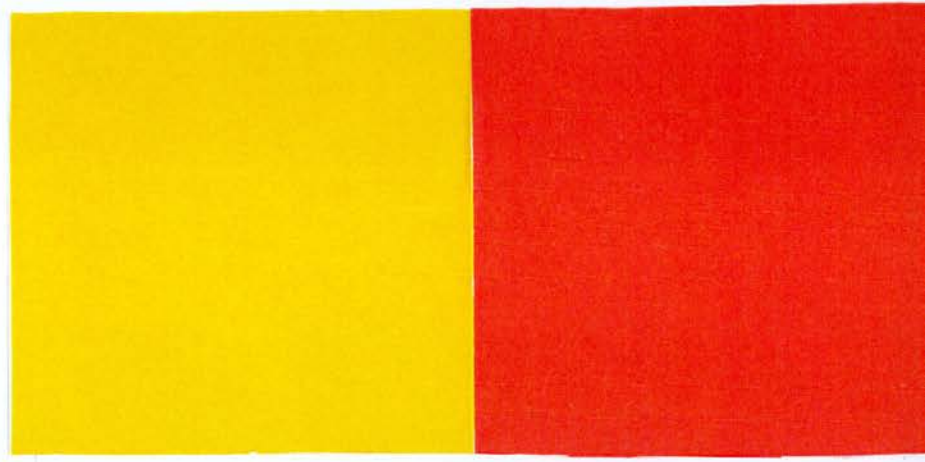
BLUE & yellow-BLUE



6. Combination of pure primary and subordinate primary:  
 Strong repulsion  
 Both the asymmetry between primary and mixed colour and the structural opposition already encountered above (2) cause strong repulsion.



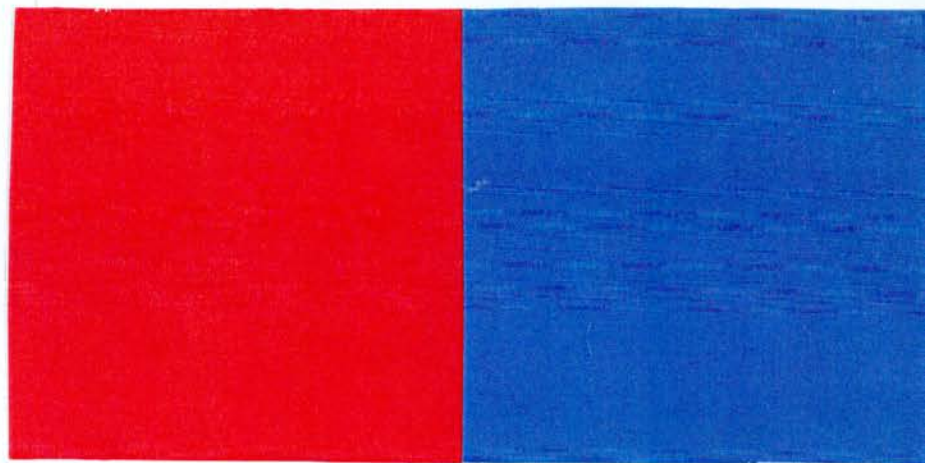
YELLOW & yellow-RED



YELLOW & yellow-BLUE



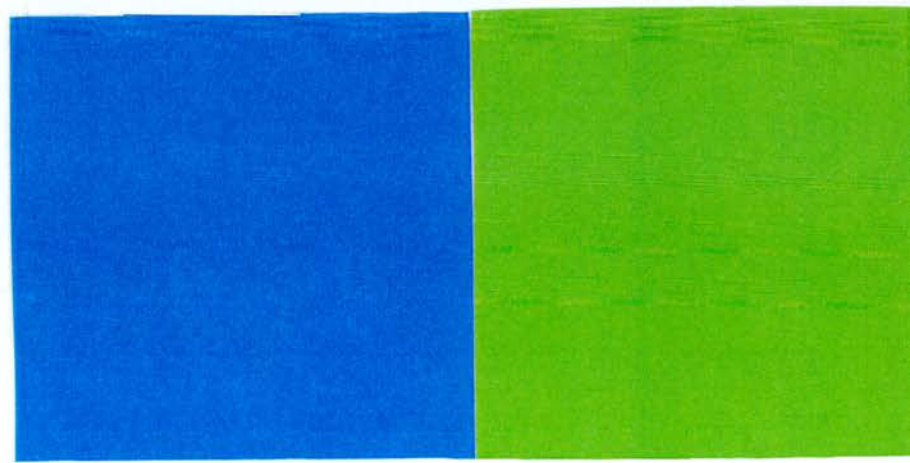
RED & red-BLUE



RED & red-YELLOW



BLUE & blue-YELLOW



BLUE & blue RED



In paintings these effects can be used for three different purposes: For representational purposes mutually repelling colours can enhance contrasts between figures or between figure and background, while mutually attractive colours ensure that differently coloured parts of the same figure (such as pieces of clothing) still appear unified. Secondly and independently, these colour combinations impress themselves onto the perceiver as inescapably pleasant (attracting) or unpleasant (repelling), and can thus be used to characterise "good" or "bad" characters in a picture. Finally, the mutual attraction of some colours can be used to guide the perceiver across the canvas, thus facilitating an effortless grasping of the connections within the painting.

Colour effects like these seem to belong to the realm of natural rather than artistic beauty, as they act on us independently of our reason and understanding. In art the characteristics of individual colours can thus be used to express characteristics of people or objects or to communicate moods.<sup>37</sup> The strongest immediate effects are caused by primary colours (mixed colours are more likely to reveal conventions and fashions as their effects are less immediate), and Hegel even compares the effect of a pure blue to religious and moral feelings:

"Nevertheless the pure blue is nothing simple, but a specific relation of the within-each-other of light and dark. Religious sensations, the sense for justice [...] appear simple in the same way, and yet everything religious, every case of justice contains a variety of specific determinations whose unity is given by this simple sensation."<sup>38</sup>

Kandinsky<sup>39</sup> relates the effects of colour directly to spiritual meaning. To the effect of proximity or distance he adds concentric and excentric movement. That yellow and white appear to spread outwards while blue and black appear to move inwards can be confirmed by looking at equally sized circles of these four colours: The

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<sup>37</sup> Social conventions and symbolical use may intellectually interfere with or even override these effects.

<sup>38</sup> "Dessenungeachtet ist auch das reine Blau nichts Einfaches, sondern ein bestimmtes Verhältnis des Ineinander von Hell und Dunkel. Religiöse Empfindungen, das Gefühl des Rechtes...erscheinen als ebenso einfach, und doch enthält alles Religiöse, jedes Rechtsverhältnis eine Mannigfaltigkeit von besonderen Bestimmungen, deren Einheit diese einfache Empfindung gibt." (Aesth. Part3, III, 2, 2b, beta - vol.III, p.178). See also Part 1, II, B, 2 (vol.I, p.188): "At this stage the abstract *purity* of matter in gestalt, colour, tone, etc. becomes the essential thing." - "In dieser Beziehung wird die abstrakte *Reinheit* des Stoffes in Gestalt, Farbe, Ton, usf. auf dieser Stufe das Wesentliche." as well as Aesth. Part 1, III, B, 3, 1b.

<sup>39</sup> *Über das Geistige in der Kunst*, 1952.

yellow and the white circles appear to be bigger (spreading outwards) than the blue and the black circles (see next page). Because excentric movements resist our vision, Kandinsky associates white with eternal resistance and yet possibility (birth); concentric movements on the other hand draw us into their centre, and black is hence associated with absolute lack of resistance and hence no possibility (death).<sup>40</sup>

Kandinsky's thoughts show how difficult it is to draw a clear line between purely physical (i.e. mechanical and irresistible) effects on our psychology, and social, personal or spiritual connections. For anyone but an eliminative materialist colour enters the realm of subjectivity as we begin to feel drawn to a colour or are repelled by it. For despite their immediacy, colour effects such as these appear to be different from the effects of magnetism, gravity and other physical forces. While a materialist might argue that colours are essentially of the same kind as these forces (albeit more complex), dualists and idealists argue that colours affect our emotions because of the partaking of colour in subjectivity: For Hegel and Schelling colour shares the absolute subjectivity of light, while for Goethe and Schopenhauer colour is essentially subjective through the activity of the retina (which Hegel and Schelling replace by a more general concept of subjectivity of the perceiver). According to the Empedokles principle of like causing alike, it is thus the subjective side of colour which causes subjective reactions, while its objective features (its material basis) cause objective changes (such as in the size of the pupil or in brain states).

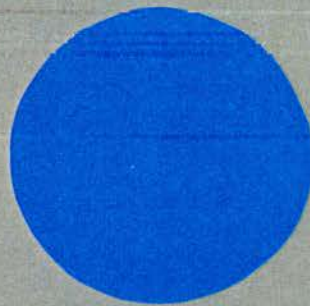
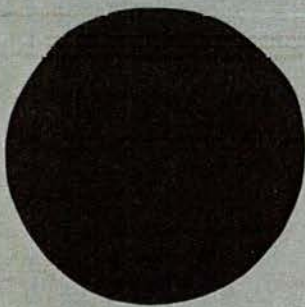
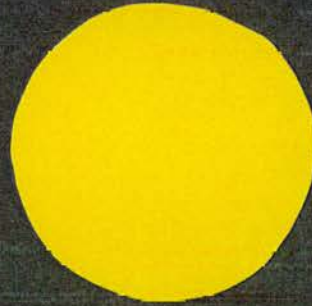
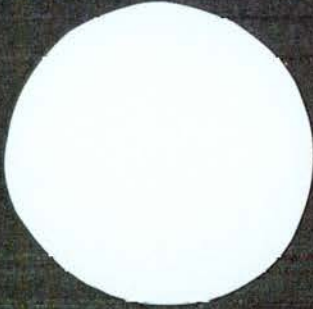
Whatever its precise nature, the immediate effects of colour can be used by artists to express feelings and emotions. In section 4 of this chapter I shall show how the twofold effect of colour simultaneously representing an external world and affecting observers emotionally can be used to transcend both of these components. An alternative kind of transcendence, however, is already achieved in colour harmony.

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<sup>40</sup> As further details would lead too far astray I include an overview of Kandinsky's pairs of oppositions in the appendix.

Colour as affecting our judgment of size

The white and yellow circles look bigger than the blue and black ones do.



### 3. Colour Composition: Harmony and Disharmony

"For harmony is a relation of qualitative differences, namely of a totality of such differences as is founded on the nature of the matter itself."<sup>41</sup>

To create beauty, the effect of a single colour is not sufficient. As I have just shown, single colours act like natural phenomena (what Goethe, Hegel, Schelling and Schopenhauer call "das Naturschöne" - "natural beauty"): we are unable to escape their effects. Painting should not attempt to reproduce forces of nature but use them in order to produce something new.<sup>42</sup> This the artist achieves in colour composition.

Colour composition can aim at achieving harmony or disharmony. The first of these is a balance of the colour effects just described, and the second an off-setting of this balance. Harmony and disharmony are subjective in the sense that they depend on human observers,<sup>43</sup> but they are not dependent on individual observers and their feelings about individual colours (otherwise they could not be communicated to the many observers in art galleries).

In his book *Interaction of Color*, Josef Albers claims that colour is the most relative medium in art. According to Albers, there are three kinds of things that colour is relative to: the perceiver, other colours, and shape and content. In this section I shall discuss the first two of these, as they both contribute to colour harmony in a painting. The relation to shape and content I shall return to in section 4.

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<sup>41</sup> "Die Harmonie nämlich ist ein Verhalten qualitativer Unterschiede, und zwar einer Totalität solcher Unterschiede, wie sie im Wesen der Sache selbst ihren Grund findet." (Hegel, Aesth. Part1, 2, Bc - vol.I, p.187)

<sup>42</sup> On the inadequacy of human attempts at imitating nature and natural forces see for instance, Hegel (Aesth. "Das Verhältnis des Ideals zur Natur" : Part1, III, A2; vol.I, pp.212-229); Goethe "Einfache Nachahmung der Natur. Manier. Stil" (HA12, pp.30-34) and "Einleitung in die Propyläen" (HA12, pp.38-55); Schelling, PhK I/5 §87, pp.546-7); and Kandinsky, *Über das Geistige in der Kunst*, p.56.

<sup>43</sup> Colour blind people see different colours as harmonising with each other than normally sighted people do.

### 3.1. Colour as relative to the perceiver: the demand for subjective totality

Besides the obvious fact that colour-blind and colour normal people have different colour experiences and that these might vary slightly even among colour normal people, colour is relative to the perceiver in a more essential sense: As the eye strives to supplement the colour it sees with its own complementary, any picture which contains only or predominantly one colour makes our eyes produce the complementary of this colour in a space close to this colour (close in space but also in time). If there is a neutral (white, black or grey) surface close to the colour seen we will see this surface coloured as the complementary of the colour originally observed ("simultaneous contrast"). And if there is no such neutral space (if for instance, we are in a room entirely painted in one colour) we will see its complementary as soon as we leave the impression of that colour, either by closing our eyes or by leaving the room ("successive contrast" or "after-image").

Most paintings, of course, do not consist of just one colour. Our eyes thus over-impose complementary colours on *any* colour next to the colour which causes a strong effect. To counteract this effect Goethe demands colour totality in a painting:

"We before stated that the eye could be in some degree pathologically affected by being long confined to a single colour; that, again, definite moral impressions were thus produced, at one time lively and aspiring, at another susceptible and anxious - now exalted to grand associations, now reduced to ordinary ones. We now observe that the demand for completeness, which is inherent in the organ, frees us from this restraint; the eye relieves itself by producing the opposite of the single colour forced upon it, and thus attains the entire impression which is so satisfactory to it."<sup>44</sup>

"If again, the entire scale is presented to the eye externally, the impression is gladdening, since the result of its own operation is presented to it in reality."<sup>45</sup>

As totality of colour can free our eyes from the irresistible effects of strong colours and our own physically necessary counteractions, totality is the beginning of the spiritual in art, because it allows for freedom from physical causality. Surprisingly, only

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<sup>44</sup> "Wurden wir vorher bei dem Beschauen einzelner Farben gewissermaßen pathologisch affiziert, indem wir, zu einzelnen Empfindungen fortgerissen, uns bald lebhaft und strebend, bald weich und sehnd, bald zum Edlen emporgehoben, bald zum Gemeinen herabgezogen fühlten, so führt uns das Bedürfnis nach Totalität, welches unserm Organ eingeboren ist, aus dieser Beschränkung heraus; es setzt sich selbst in Freiheit, indem es den Gegensatz des ihm aufgedrungenen Einzelnen und somit eine befriedigende Ganzheit hervorbringt." (Fl.§ 812, see also rest of this section, Fl.§§ 808-815).

<sup>45</sup> "Wird nun die Farbentotalität von außen dem Auge als Objekt gebracht, so ist sie ihm erfreulich, weil ihm die Summe seiner eigenen Tätigkeit als Realität entgegenkommt." (FL. § 808)

## Simultaneous Contrast

The grey square in the middle of the red square appears to have a strong greenish tint - an effect, by the way, which colour-blind people do not see.



Schopenhauer makes a similar point. As I wrote in chapter V, Schopenhauer sees the purpose of art in the facilitation of the grasping of Platonic Ideas. Platonic Ideas are, however, only accessible when we are free from the forces of the Will. Because the beauty of colour harmony frees us from the natural (physical) forces of individual colours (i.e. from their effect on our will), it lets us enter a state of pure representation and hence allows us to attain truly objective knowledge (Erkenntnis). Although a mere tool and hence not a Platonic Idea itself, colour harmony is therefore a prerequisite for good art, which like all art forms should strive to communicate Platonic Ideas:

"This subordinate kind of beauty, which is added [to painting] helps the state of pure knowledge, and in painting is the same as diction, metre and rhyme are in poetry: for both are not the essential but the first and immediate effect."<sup>46</sup>

Hegel demands colour totality because to him colour is by nature structured totality ("eine durch die Natur der Sache gegliederte Totalität").<sup>47</sup> If colours do not appear in their totality (objectively), our corresponding subjective "sense of totality" ("Sinn der Totalität") misses something. Thus the eye does not rest in reconciliation with the external world unless it is presented with totality.<sup>48</sup> Reconciliation is an essential concept for Hegel as for him painting is an essentially Christian art form.<sup>49</sup> It is the reconciliation of the subjective (God/ spirit) with the objective (human/ matter), first achieved in the human death and heavenly resurrection of Jesus Christ, which is repeated in painting when the subjective (human observer) is reconciled with the

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<sup>46</sup> "Diese ihr [der Malerei] beigegebene, untergeordnete Art der Schönheit befördert den Zustand des reinen Erkennens und ist in der Malerei das, was in der Poesie die Diktion, das Metrum und der Reim ist: beide nämlich sind nicht das Wesentliche, aber das zuerst und unmittelbar Wirkende." (WWVII, §36, pp.541-2)

<sup>47</sup> Hegel, Aesth. Part3, III, 1, 2b, Γ, BB (vol.III, p.75).

<sup>48</sup> "Furthermore, the colours must be combined in such a way that both their artistic opposition and the reconciliation and dissolving of the same and thereby peace and reconciliation for the eye come into being...it is partly the kind of combination, partly the degree of intensity of each colour which cause such force of opposition and peace of mediation." -  
 "Weiter aber die müssen die Farben so zusammengestellt werden, daß sowohl ihr malerischer Gegensatz als auch die Vermittlung und Auflösung desselben und dadurch eine Ruhe und Versöhnung fürs Auge zustande kommt...teils die Art der Zusammenstellung, teils der Grad der Intensität jeder Farbe bewirkt eine solche Kraft des Gegensatzes und Ruhe der Vermittlung." (ibid.)

<sup>49</sup> Schopenhauer too believes that painting is a Christian form of art but does so for different reasons (WWV II §36, p.538). He uses the concept of reconciliation when he writes about music, which like Hegel he praises as an art form superior to painting. If we transfer Schopenhauer's concept of reconciliation to painting we arrive at a balance between symmetry (rhythm) and colour (tone). Hegel, on the other hand, seeks reconciliation within colour.

objective (matter of the painting) in the aesthetic experience. The opposition between subject and object as well as that between one colour and another can be "aufgehoben" ("preserved and uplifted into new and higher unity") by avoiding strong contrasts, oppositions and "wild" mixtures of colours,<sup>50</sup> but also by avoiding a mere dissolving of oppositions into a "cloudy-weak-sad" ("trüb")<sup>51</sup> mixture<sup>52</sup>. Most importantly Hegel demands the totality of differences (rather than just some of them) which is achieved in the balance of primary colours, for "Such a totality in its unity ("Einklang") is the essentially harmonic."<sup>53</sup>

Schelling's argument for totality of colour in painting is based on pre-established harmony between internal and external systems of necessity which are based on identity and difference:<sup>54</sup>

"The eye demands in everything, which is to be presented to it as pleasing, the harmony of colours according to the same necessity and the same laws to which it [the harmony] is produced in external appearances. The greatest pleasure of the eye is to be taken out of the weary identity and then through totality to be brought to complete balance in a state of highest difference. Therefore the eye in general demands totality of colour in every painting."<sup>55</sup>

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<sup>50</sup> Aesth., Part1, II,B,1c and 2.

<sup>51</sup> See appendix for meanings of "trüb".

<sup>52</sup> Aesth., Part1, II, B, 2 and Part1, III, B, 3, 1b

<sup>53</sup> "Näher gehört sodann zur Harmonie eine Totalität von Unterschieden, welche der Natur der Sache nach einem bestimmten Kreise angehören; wie die Farbe zum Beispiel einen bestimmten Umfang von Farben als die sogenannten Kardinalfarben hat, welche aus dem Grundbegriff der Farbe überhaupt sich herleiten und keine zufälligen Vermischungen sind. Eine solche Totalität in ihrem Einklange macht das Harmonische aus." (Aesth., Part1, III, B, III, 1a - vol.I, p.324)

<sup>54</sup> see also F.Steinkamp, "Difference and Indifference", 1991.

Colour is a prime example of the relation between identity and difference: As the phenomenon of simultaneous contrast shows, each colour contains the capacity to point beyond itself to its opposite and is thus in a state between being itself and being its own negation. In colour totality the negation (complementary) of individual colours leads back to the same colour totality and hence lets the eye rest.

<sup>55</sup> "Das Auge fordert in allem, was ihm als wohlgefällig dargeboten werden soll, die Harmonie der Farben nach derselben Notwendigkeit und denselben Gesetzen, nach welchen sie in der äusseren Erscheinung produziert wird. Die höchste Lust des Auges ist, indem es aus der ermüdeten Identität gesetzt wird, in der höchsten Differenz doch wieder durch die Totalität in ein vollkommenes Gleichgewicht gesetzt zu werden. Deswegen fordert das Auge im Allgemeinen in jedem Gemälde Totalität der Farben." (PhK,I/5, p.516).

### 3.2. Colours as relative to other colours: objective harmony

Independently of observers, colour spaces can illustrate how totality can be determined quantitatively. Schopenhauer's fractions allow calculation of one kind of totality, while other colour spaces demand others. Generally speaking, a colour space with three primary colours will demand different proportions from a colour space with four primary colours (which contains relatively more green or yellow). Additionally, harmony of lightness and saturation can also be established. While it is easy to calculate average values from colour spaces in order to perfect colour totality, there is an infinite number of ways in which the same colour space will yield quantitatively balanced results. Goethe and Hegel offer the same three ways in which totality can be achieved quantitatively:<sup>56</sup>

First, all colours can be given in their strongest (most saturated) form in equal proportions. This kind of harmony is difficult to achieve, as each colour at its strongest has powerful effects which can barely be balanced. Thus only great masters of painting ever achieve strong totality of colours. Poussin's *Holy Family on the Steps* is a good example of consciously achieved colour totality, but generally speaking it is the twentieth century artists who balance primary colours or even make them the object of their painting (e.g. Bauhaus and de Stijl artists).

Secondly, weaker artists will avoid the difficulty of balancing strong colour effects and instead choose weaker, i.e. less saturated, colours. Paintings in weak pastel colours belong into this category, some of which are purely decorative (think of the way Monet's waterlilies have been used for fabrics, teacups and other ornate objects, and also of the pastel prints which decorate so many public buildings). In Goethean terms, these are "weak" paintings, but because of their use of predominantly light rather than dark colours they remain on the active side and hence have a pleasing happy effect. On the passive (unhappy) side we get the generally brownish and greenish colours in much landscape painting. In both cases,

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<sup>56</sup> Goethe, Fl. §§880-95; also as quoted in Hegel (vol.III, p.77); Hegel (Aesth. Part3, III, 2b, Γ, §§ - vol.III, pp.75-77).

"The harmonious contrasts are often found to be very happily felt in such pictures, but without spirit ("Mut" - "courage"), owing to a dread of the motley ("Bunten" - "colourful")." <sup>57</sup>

According to Goethe, Hegel and Schelling, though perhaps surprisingly, the third and richest form of colour harmony is achieved in the painting of human flesh:

"For this is an ideal within-each-other of all main colours. Through the transparent yellow of the skin shines the red of the arteries, the blue of the veins, and in addition to the light and dark and other various shinings and reflections there are grey, brownish, even greenish tones, which at first seem highly unnatural and can yet be correct and with true effect. And at the same time this Shining-within-each-other is totally glossless, i.e. no shining of something other appears in it, but it is soulful and alive from the inside." <sup>58</sup>

"The highest marriage of light with matter, so that the essence becomes all matter and all light, takes place in the production of the flesh. The flesh is the true chaos of all colours and therefore not similar to any of them but the least dissolvable and most beautiful of all mixtures. Yet this altogether unique kind of colour is in addition not immobile, like the other kinds of colour, but is lively and mobile." <sup>59</sup>

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<sup>57</sup> "Man findet in solchen Gemälden oft die harmonischen Gegenstellungen recht glücklich, aber ohne Mut, weil man sich vor dem Bunten fürchtet." Fl. §895.

<sup>58</sup> "Diese aber ist ein ideelles Ineinander aller Hauptfarben. Durch das durchsichtige Gelb der Haut scheint das Rot der Arterien, das Blau der Venen, und zu dem Hell und Dunkel und dem sonstigen mannigfaltigen Scheinen und Reflexen kommen noch graue, bräunliche, selbst grünliche Töne hinzu, die uns beim ersten Anblick höchst unnatürlich dünken und doch ihre Richtigkeit und wahrhaften Effekt haben können. Dabei ist dieses Ineinanderscheinen ganz glanzlos, d.h. es zeigt kein Scheinen von anderem an ihm, sondern ist von innen her beseelt und belebt.." (Hegel, Aesth., *ibid.*, pp.78-9); see also Goethe, Fl.§§877-878.

<sup>59</sup> "Die höchste Vermählung des Lichtes mit dem Stoffe, so dass das Wesen ganz Stoff und ganz Licht wird, geschieht in der Produktion des Fleisches. Das Fleisch ist das wahre Chaos aller Farben und deshalb keiner besonders ähnlich, sondern die unauflöslichste und schönste Mischung aller. Aber auch diese ganz einzige Art der Farbe ist noch überdies nicht unbeweglich, wie die anderen Arten der Farbe, sondern lebendig und beweglich." (Schelling, PhK,I/5, p.540).

### 3.3. Painting and Music

Goethe believed that colour and music were "like two rivers from the same source" whose phenomena could therefore be derived from the same higher principle.<sup>60</sup> The comparison between painting and music, colour circles and musical scales deserves a thesis of its own, but I shall only very briefly look at the similarities and differences between the two, and shall ignore their most obvious difference completely, namely that painting is a spatial and music a temporal art.<sup>61</sup> Similarities between the two art forms are already apparent in the terminology which both art forms share: tone, harmony, composition, and timbre (in German called "Klangfarbe" - "sound-colour").

I shall begin with the notion of "tone". Each musical tone, as opposed to a mere sound, has a clearly defined place in the musical notation. A musical tone is therefore more like a primary colour than just any "tone of colour", with half-tones taking the place equivalent to secondary colours. Much like colour spaces musical notations may differ culturally (have different numbers of central tones - numbers of primary colours), but we are yet able to distinguish clear tones from messy sounds.<sup>62</sup> In ancient Greece there were two schools of musical tones: the Pythagoreans with their five tone system,<sup>63</sup> and the Aristoteleans with their seven tone systems.<sup>64</sup> The development of

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<sup>60</sup> Fl.§§747-750: "Verhältnis zur Tonlehre" - "Relation to harmony"; like the English word "tone" the German "Ton" can refer both to a tone of colour and a tone in music, a connection much exploited by synaesthetic artists.

<sup>61</sup> Even if a symphony contains some spatial elements and a painting is usually "read" from left to right over a certain period of time, they are still essentially temporal and spatial respectively (see also Arnheim, p.375).

<sup>62</sup> Strangely, this is contested by Rousseau, who argues that sounds cannot be identified individually in the way that colours can. ("Essay on the Origin of Languages", 1764, in Gage, p.236). In the same essay Rousseau also stresses that the band of the visible spectrum is narrower than the frequencies of audible sound, a fact which accounts for the difficulties of associating colours with individual sounds (see below).

<sup>63</sup> The five tone system was transferred to colour by Scarmilionius (*De Coloribus*, 1601) and several others in comparisons between colour relations and musical fifths (see Gage, pp.153-4); Arcimboldo developed the idea for a "gravicembalo" with a double octave for the grey shades and five hues in the 1580's (ibid.); one might also count the association of colour with vowels into this category, (Gage,p.209) .

<sup>64</sup> In the *Republic* Plato associates seven rings of the solar system with seven colours (of rather obscure description) combined with notes of constant pitch, which together make up a single scale (book X, "Myth of ER", 616e)

As the seven tone system corresponds to the musical octave, Newton used Descartes' diagram of seven tone musical harmony to illustrate his colour relations. Newton thought a musical division of the spectrum suitable "not merely because it agrees with the phenomena very well, but also perhaps because it involves something about the harmonies of colours [...] perhaps analogous to the concordances of sounds"

twelve tone music in a sense combined the two systems and led to a number of synaesthetic compositions at the beginning of this century.<sup>65</sup>

The assignment of colours with particular tones is, however, problematic. The first difficulty with any such assignment is that colour forms a closed space, while musical tones form a line. Any octave higher or lower than the one first established, therefore has to repeat the colour sequence of the first, or use new colours, both of which seem counterintuitive options. Instead of assigning colours to quantifiable pitch, nineteenth century artists therefore begin to look at timbre ("Klangfarbe"), which offers several qualitative ways of associating colour with sound, such as association of colours with instruments, moods, keys, etc.

In the "Historical Part" of his *Farbenlehre* Goethe critically reviews J.L.Hoffmann's work (1786), which offers detailed parallels between colour and music. Among other things, Hoffmann associates blue shades with string instruments, green with the human voice, and the yellow and red shades with wind instruments.<sup>66</sup> Many Romantics associated (light) blue with flutes (see Gage, p.298, note 89), and the association of dark blue with the cello was especially stressed by Kandinsky (*Über das Geistige in der Kunst*, p.93), who seems to have had genuine synaesthetic experiences:

"It sometimes seemed to me as if the brush, as it tore pieces with inexorable will from this living being that is colour, conjured up in the process a musical sound. Sometimes I could hear the hiss of the colours as they mingled."<sup>67</sup>

While I believe that much of synaesthesia is subjective in the strong personal sense, an ear-piercingly high and loud tone indeed seems to be similar in effect to a dazzling

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(Cambridge Lecture, 1669). In an unpublished draft for his *Opticks* Newton even suggests harmonious combinations of particular colours (such as orange and indigo forming fifths). "But this harmony and discord of colours is not so notable as that of sounds because in two concordant sounds there is no mixture of discordant ones, in two concordant colours there is a great mixture, each colour being composed of many others." - A statement which Goethe and his followers (including myself) naturally object to. - (both quoted in Gage, p.232)

<sup>65</sup> Schönberg's *Die glückliche Hand*, for instance, is to be accompanied by colour (Gage, p.244); Itten divides his twelve part colour circle (see ch.VIII) into seven "rational" and five "emotional" tones (Gage, p.242).

<sup>66</sup> Like Goethe, I think that Hoffmann's list in all its detail is contrived, but I shall include it in the appendix. For Goethe's summary see HA 14 (pp.244-248).

<sup>67</sup> Kandinsky, *Reminiscences*, 1914, quoted in Gage, p.208.

light, while a sonorous bass has much in common with soft dark colours (as painted in Graubner's "colour-spaces" ("Farbkörper") for instance), and would not be associated with a bright yellow.<sup>68</sup> Yet one should beware of assigning particular colours to particular musical entities. D.D.Jameson's colour notation for popular tunes on his coloured piano keyboard used Goethe's active and passive colours for major and minor key respectively (Gage, p.235), but as Wittgenstein correctly remarks:

"One and the same theme has a different character in minor key than in major, but it is totally wrong to speak of a character of the minor key in general. (In Schubert the major key often sounds sadder than the minor key.) And so it is, I believe, pointless and without use for the understanding of painting to speak of the characters of single colours...."<sup>69</sup>

But even if I have to conclude that precise assignments of single colours to particular musical entities, be they pitch, mood, instrument, key or anything else, appears to be both subjective and context dependent, this does not mean that the comparison between colour and music is fruitless. If we assume that at least some musical tones have strong and inescapable physical and psychological effects on us (even if these do not correspond precisely to the effects of individual colours), the role of harmony in music can be taken to be the same as it is in painting: to balance and thus to transcend purely physical effects. The nineteenth century notion of "tuning" the palette describes well, how colour balance might be a prerequisite of harmony, just as the tuning of an instrument is a prerequisite for producing harmonious sounds.<sup>70</sup>

As in painting, we find weak and strong forms of harmony in music.<sup>71</sup> "Easy listening" and the kind of classical music played in hotels or restaurants (often simplified versions of stronger harmonies) belong to the weak category. As Goethe writes about painting, they are pleasing but lack courage. To the "unhappy" harmonious

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<sup>68</sup> Yet some earlier systems apparently associated dark colours with *high* pitch (Gage, p.230).

<sup>69</sup> "Ein und dasselbe Thema hat in Moll einen anderen Charakter als in Dur, aber von einem Charakter des Moll im allgemeinen zu sprechen, ist ganz falsch. (Bei Schubert klingt das Dur oft trauriger als das Moll.) Und so ist es, glaube ich, müßig und ohne Nutzen für das Verständnis der Malerei von den Charakteren der einzelnen Farben zu reden." (Verm.Bem. (C&V), p.570).

<sup>70</sup> See also Gage, p.185.

<sup>71</sup> Although there is no direct parallel to the painting of human flesh in music, one might also say that the piece as a whole expresses human spirit (see also Schopenhauer below).

paintings in dark colours, there might correspond the moody pieces so much adored by teenagers and drunk and lonely adults.

A stronger form of harmony is achieved in the symphonies of the great composers. Much like good paintings, good symphonies live from a totality of differences: while each note seems to demand the note that follows it by inner necessity and thus guides us through the symphony in themes and melodies,<sup>72</sup> there are also strong counterpoints pulling us into different directions. And just as colours shine most in relatively dark paintings, so too a melody can seem overwhelmingly pure and beautiful in an otherwise "dark" symphony. (Think for instance of the effect of the chorus in Beethoven's ninth symphony, or of some of the songs used in Mahler's symphonies.) That the importance of totality is the same in music and in painting can be observed when we compare the effects of popular extracts, as heard in advertisements or seen on gallery souvenirs, to the same extracts within their complete contexts.

Composition in both art forms is partly based on quantitative measures as learnt in art and music classes. These, however, have changed over the centuries. Also, there is an infinite number of ways in which the parts can be combined to yield quantitative totality, and yet only very few of these combinations are good pieces of art. Music pieces of the three major schools of musical composition, Baroque counterpoint, strictly "Classical" and Romantic music, and modern twelve tone music, have all been accompanied by colour compositions.

In the 1720's the French Jesuit Louis-Bertrand Castel began work on an "ocular harpsichord",<sup>73</sup> but it was not until the first decade of this century that the Baroque counterpoint was applied to painting. Especially Morgan Russell (*Creavit Deus Hominem/ Synchrony no.3: Color Counterpoint*, 1914), Theo van Doesburg, who in 1923 described his rectangular forms as the "thorough bass of painting" (Gage, p.241), and Paul Klee (*Ad Parnassum*, 1932) all admired Bach, and the latter is reported to have said:

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<sup>72</sup> Arnheim interestingly compares the effect of hearing the same tone rising and falling although it is of course a sequence of individual tones, to the perception of a dot as moving, although it is in fact a series of dots being lit one after the other. (Arnheim p.392)

<sup>73</sup> See Gage, p.233 for details.

"Music already saw and solved the question of abstraction in the eighteenth century, but this was muddled again by the programme music of the nineteenth. Painting is only now taking it on board."<sup>74</sup>

But at the same time Piet Mondrian saw Jazz and other modern forms of music as the equivalent of his paintings,<sup>75</sup> and Kandinsky proclaimed that the solid foundation of the thorough-bass had to be discarded in the twentieth century, as harmony was no longer suitable for modern times.<sup>76</sup>

Despite these parallels between painting and music, the German idealists generally rate music as a higher, more spiritual art form than painting, because music is less bound to matter. Schopenhauer even denies any relation between music and painting: To him music is an immediate expression of the Will while painting like all other art forms is essentially representational and hence aims at freedom from the will.

"[Music is] such an *immediate* objectivation and picture of the whole *Will*, just like the world itself, and the [Platonic] Ideas whose manifold appearance is the world of the individual objects. Music is therefore not at all like the other art forms an image of the Ideas; but it is an *image of the Will itself*, whose objectivity can also be found in the Ideas: this is why the effect of music is so very much more powerful than that of the other art forms: for they merely talk of shadows while it [music] speaks of essence."<sup>77</sup>

Thus, according to Schopenhauer, music can give us immediate access to the Will just as the other arts give us access to the Platonic Ideas (and via these Ideas mediate access to the Will).<sup>78</sup> Although Schopenhauer strongly contrasts the visual arts,

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<sup>74</sup> Lecture at Dessau 1927/8 (Gage, p.242; see also Gage illustrations no.189 & 193).

<sup>75</sup> In 1927 Mondrian published the essay "Jazz and Neo-Plastic" (Gage, p.242), and he also painted the *Victory Boogie-Woogie* and several Foxtrott compositions; Gene Davis compared his own work to the playing of jazz: "I seldom think about colour....I never really plan my colour more than five stripes ahead and often change my mind before I reach the third stripe. I like to think that I am somewhat like a jazz musician who does not read music and plays by ear. I paint by eye..." (Gage, p.266)

<sup>76</sup> With regret Kandinsky thus looks back to Mozart and even Beethoven as no longer appropriate (*Über das Geistige in der Kunst*).

<sup>77</sup> "[Musik ist] eine so *unmittelbare* Objektivation und [ein] Abbild des ganzen *Willens*, wie die Welt selbst es ist, ja wie die Ideen es sind, deren vielfache Erscheinung die Welt der einzelnen Dinge ausmacht. Die Musik ist also keineswegs gleich den anderen Künsten das Abbild der Ideen; sondern *Abbild des Willens selbst*, dessen Objektivität auch die Ideen sind: deshalb eben ist die Wirkung der Musik so sehr viel mächtiger als die der anderen Künste: denn diese reden nur von Schatten, sie aber vom Wesen." (WWVI, §52, p.359)

<sup>78</sup> Schopenhauer goes as far as claiming that the intervals of the musical scale are parallel to the steps in the objectivation of Will in nature, i.e. the various species in nature. He further compares any deviation from the arithmetic correctness of the musical intervals due to temperature or other changes in circumstances to deviations in nature from perfect specimen of a species. (WWVI, §52)

which allow access to Platonic Ideas, against music, which allows access to the Will itself, the fact that he fails to capture colour relations purely quantitatively in his own theory of colour (see ch.II, sect.2.1) may show another close affinity between colour and music: The numbers representing each colour are either correct in relation to their darkness or to each other, but never to both at the same time. Similarly, the various tones in a symphony can never result in a mathematically harmonic system, because the numbers by which the tones can be represented have irresolvable irrationalities: if the tones are "correct" in relation to the fundamental tone (bass) they are not so to each other - so that a mathematically correct piece of music cannot even be thought of or put into practice.

Aristoteleans might agree with Schopenhauer: in *Problems*<sup>79</sup> Aristotle claims that colours as opposed to music have no moral power, and later Aristides writes that music has a direct effect on body and soul, whereas painting conveys only a "tiny fragment" of life.<sup>80</sup> We must remember that Schopenhauer, and probably also Aristotle and Aristides, write about colours as tools for representation rather than as aesthetic ends in themselves. As I hope to have shown in the previous section, colours do have strong effects on us (on body and soul). G.Field, for instance, writes: "...it is evident colors have a science as distinct from any association with figure or forms ... as that of music is from the figurative language of poetry."<sup>81</sup>

If Field is right, and I think he is, then it is perhaps surprising that

"mankind has until now [1913] always tried to satisfy its need for the highest spiritual exultation only in music. Only tones have been able to grip us and transport us to the highest realms. ... Yet color is just as capable of music of providing us with the highest extacies and delights."<sup>82</sup>

Schopenhauer compares music in general to a universal language which similarly to geometrical figures and numbers can be understood a priori but is not

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<sup>79</sup> *Problems*, XIX, 27, 29 (Gage, p.227)

<sup>80</sup> *On Music*, Gage, p.227.

<sup>81</sup> *Aesthetics, or the Analogy of the Sensible Sciences Indictaed, with an Appendix on Light and Colors*, 1820 (Gage, p.235)

<sup>82</sup> Morgan Russell (1913), in Gage, p.241.

abstract. But if a symphony can picture the whole world in its own language, I see no reason why colour should not be able to achieve the same thing, provided we do not think of colours as stable patches but as complex and interrelated forms. Concentrating on different colour relations within one painting will lead to different views and hence ways of understanding the same picture. If the painting is a true masterpiece it can encompass the totality of all colour relations and hence in the form of colour encompass the whole world, much like a master symphony can encompass the whole world in music.<sup>83</sup>

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<sup>83</sup> This assumes that the internal relations of colour are forms of more general relations, which can be found in all aspects of life. The inclusion of external relations of colour with other properties, widen the range in which colour compositions might affect us even further. The possibility of colour therapy, for instance, undermines Schopenhauer's argument, for only if colour can be an immediate force of the Will can it have such fundamental (non-intellectual) effects on us.

#### 4. The Spiritual in Art

The last three sections established that painting can represent light and three-dimensional objects, that individual colours have irresistible effects on us, and that these effects can be strengthened, softened or balanced in colour harmonies, so that effects of individual colours can be transcended (in Hegelian terms they are thus "aufgehoben"). In this section I wish to explain how the representational and expressive qualities of colour can be used to communicate subjectivity and possibly even spirituality.

In order to do so I shall briefly look at representational and abstract painting (both conceptual and non-conceptual). For the effect of colour in painting is twofold (intrinsic and representational). Kandinsky aptly calls this difference one between "inner" and "outer" beauty in painting,<sup>84</sup> a difference which can best be illustrated by the difference between representational and non-representational art, although abstract art too can have external beauty and all good representational paintings also have internal beauty.

In representational art we cannot but praise a picture as beautiful in conjunction with its represented subject matter. Thus we say, "what a beautiful portrait of a woman", or even, "oh, what a beautiful landscape". The representational painting seems to capture the beauty of a person, landscape or object, and it is thus at least partially beautiful in virtue of what it represents, i.e. something external to the picture, which the painter has captured or enhanced by good composition, colour etc.<sup>85</sup> Abstract art, on the other hand, is beautiful in virtue of its inner properties alone (form and colour), as it does not represent anything external to itself. (If it does refer to something external to itself, as conceptual art does, it is not *beautiful* in virtue of this other). Abstract art is thus beautiful in virtue of what it *is*, whereas representational art is mostly beautiful in virtue of capturing the beauty of what it *represents*.

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<sup>84</sup> I am aware that the notion of beauty is in itself problematic, but let us for now assume that we know what we mean when we say that a person or an object is beautiful.

<sup>85</sup> Please note that the reverse is not true: the most beautiful person, landscape or object will not make a beautiful painting unless the latter is well painted (composed).

#### 4.1. Representational Painting

The fact that it is possible to create three-dimensional effects by the use of colour alone is a great advantage in painting: not only does the actual presence of a three-dimensional object thereby become superfluous,<sup>86</sup> but the colour which takes its place is itself a much higher principle:

"Painting by no means lacks the third dimension but discards it intentionally to replace the merely spatially real by the higher and richer principle of colour."<sup>87</sup>

According to Hegel, the partial replacing of space by colour makes the art work richer because it allows us to replace material objectivity by ideal subjectivity. As we have seen, what distinguishes painting from all other art forms is its sensual material, colour, which facilitates the internalisation of the subjectivity of light in matter. As "subjectivated and set-as-ideal visibility"<sup>88</sup> painting transfers material objects into a subjective and ideal setting. It does so quite literally by creating a two-dimensional ideal (in the sense of not real but to be imagined) setting in which there are ideal laws of vision, namely the laws of light and colour, which alone determine what we see. (We are not able to walk around the painting to look at what lies behind the tree; nor are we able to illuminate a dark part of the picture by shining a light into it.)

It is through the internalisation of external, material features in colour pigments that painting can externalise internal features. Thus it is the subjective aspects of colour that enable the artist to express subjectivity and hence the colour magic of painting ("malerischer Farbenzauber"), which

"through the delicacy and variety of its nuances is also capable of making visible the whole richness of particular characteristics and the whole externalising (lit."stepping-

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<sup>86</sup> "The figure (Gestalt) is produced by light and shadow and thus becomes superfluous for itself as real figure (Gestalt)." - "Die Gestalt wird durch Licht und Schatten gemacht und ist für sich als reale Gestalt überflüssig." (Hegel, Aesth., Part3, III.1.1b) β) ββ) - vol.III, p.33)

<sup>87</sup> "die Malerei entbehrt die dritte Dimension nicht etwa, sondern verwirft sie absichtlich, um das bloß räumlich Reale durch das höhere und reichere Prinzip der Farbe zu ersetzen." (Hegel, Aesthetics, Part3, III, 1, 1b, double gamma).

<sup>88</sup> "in sich subjektivierte und ideell gesetzte Sichtbarkeit" (Hegel, Aesth., Part3, Einteilung)

out") of spirit as internality as well as the full summary of the soul (Gemüt) in itself through the soul-view of the eye (Seelenblick des Auges)."<sup>89</sup>

Perhaps the spirituality of representational painting can be summarised in this one expression - "Seelenblick des Auges" - for it captures the three ways in which painting makes visible soul/spirit/subjectivity:

First of all, painting is the only one of the visual arts that *represents* eyes.<sup>90</sup> Even sculptures with painted eyes do not appear to look at us, while in (good) paintings people do look. They may look at something or someone in the picture or at the observer of the painting (think of the most famous of mysterious looks, the *Mona Lisa*).

Secondly, the eyes painted carry more *expression* than anything else in the picture. Thus a painted body may look as if it was in pain but can be redeemed by the look in the eyes. Also, a healthy and good looking body can be made meaningless by a tortured look in the eyes. The expression of someone's eyes, be they real or painted, can haunt us even if we have forgotten other features. (This is presumably so, because the eyes are the most expressive feature of our bodies.) The fact that painting cannot only duplicate such expression (like film and photography can), but can in fact *create* such expressions remains a mystery which any reduction to the physical properties of paint and canvas fails to explain.

Thirdly, the soul becomes visible not only through the look of the figure in the painting but also through that of the person looking at the painting. Here lies the importance of the subjective aspect of colour vision for painting. In the contemplation of a painting we have a true "Scheinen und Widerscheinen": the shining of colours on the canvas is reflected physically through the complementary action of our eyes, and the shining of the spirit in the painting becomes a reflection of the shining of our own spirit when the two meet in the "Seelenblick des Auges".

If we accept the premiss that the representation of eyes allows for the expression and communication of feelings and even spirituality, we can also accept the explanation by Hegel and Schelling that this is possible because colour as the material

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<sup>89</sup> "durch die Feinheit und Vielfältigkeit seiner Nuancen auch die ganze Fülle besonderer Charakterzüge und das ganze Heraustreten des Geistes als Innerlichkeit sowie die volle Zusammenfassung des Gemüts in sich durch den Seelenblick des Auges sichtbar zu machen befähigt ist." (Hegel, Aesth., Part3, II, Introduction)

<sup>90</sup> Nowadays film and photography can also capture the "Seelenblick des Auges" - think of the black and white photographs of Greta Garbo, for instance.

of painting contains light which is essentially subjectivity and spirituality. But even if one does not want to embrace their philosophy, the possibility of the communication of feelings and hence of subjectivity in painting is a good argument against the reduction of colour to exclusively objective quantities.

#### 4.2. Conceptual Art

Conceptual art essentially refers to something other than itself. Josef Kosuth in his essay "Art after Philosophy"<sup>91</sup> argues that "In this period of man, after philosophy and religion, art may possibly be one endeavour that fulfils what another age might have called "man's spiritual needs". Or, another way of putting it might be that art deals analogously with the state of things "beyond physics" where philosophy had to make assertions." (p.24)

Kosuth claims that this is possible because "objects are irrelevant to the condition of art" (p.26). By this he means, I believe, that the piece of (conceptual) art as object is irrelevant once one has grasped its idea.<sup>92</sup> If this is the case, then the material of colour is irrelevant to conceptual art (Kosuth's own works, as far as I am aware, are almost exclusively black and white). In a sense, conceptual art is therefore a step back to the pure line or outline, which I discussed at the beginning of this chapter. Conceptual pieces of art concerning colour could be a red canvas with the title "red", or a yellow and blue canvas with the title "Goethe's Polarity". Once we have grasped the ideas of these pieces (of art?) we can discard the material objects themselves (which is also why I can adequately describe them and need not include illustrations, which is not the case with other pieces of art). German idealists would have probably criticised conceptual art in the same way in which they criticised allegorical art forms: because

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<sup>91</sup> Kosuth, *Art after Philosophy and After*, pp.13-33.

<sup>92</sup> Kosuth also refers to his art as "Art as Idea as Idea" (ibid.p.20).

allegorical pictures can only be understood by reference to something external to them, they themselves are of little or no value (they can easily be copied).

Therefore the colours in conceptual art *are* reducible, albeit not to their physical properties (which are irrelevant) but to their conceptual references.

#### 4.3. Abstract Expressionism

By abstract expressionism I mean all paintings which are non-representational but still carry meaning within themselves. Unlike conceptual art, their titles are usually of no or little importance ("No Title") because they do not refer to something external to themselves. Thus I take Kandinsky's "compositions" as prime examples of this art form.

"For people who are not used to it this inner beauty [of abstract art] *naturally* appears as ugly, as man generally tends towards the outer and does not want to recognise inner necessity."<sup>93</sup> But

"External beauty is an element that forms the spiritual atmosphere. Besides the positive side, however, (as the beautiful = the good) it suffers the same lack as the talent which isn't used exhaustively - (talent in the sense of the gospel)."<sup>94</sup>

Because colour in abstract expressionism neither represents something other than itself within the picture (as in representational art) nor refers to ideas outside the picture (as conceptual art does), colour becomes its only means of expression. In abstract painting only colour contrasts constitute form, and only the composition of colour and form constitutes meaning. While I am not sure exactly how abstract painting can express feelings (a matter for psychological research) I know *that* it can do so. The

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<sup>93</sup> "Dem nicht daran Gewöhnten erscheint *natürlich* dieses innere Schöne häßlich, da der Mensch im allgemeinen zum Äußeren neigt und nicht gerne die innere Notwendigkeit erkennt." (Kandinsky, *Über das Geistige in der Kunst*, p.48.)

<sup>94</sup> "Äußere Schönheit ist ein die geistige Atmosphäre bildendes Element. Es hat aber außer der positiven Seite (da Schönes = Gutes ist) den Mangel des nicht erschöpfend ausgenützten Talentes - (Talent im Sinne des Evangeliums)." (*Über das Geistige in der Kunst*, p.26, my translation). See also Schelling: For Schelling colour qua indifference is living capacity (Vermögen) which has to be used to point beyond itself and thus transcends the purely external beauty of sculpture (cp. F.Steinkamp, 1991, p.186).

fact that we can be fascinated by completely abstract paintings, can look at them for many hours and may have strong wishes to return to them after years, may be due to any the following: either the painting itself has intrinsic objective values, or it reflects our own subjective values, or the effect is a combination of both.

I shall begin with the first case. The intrinsic objective value of an abstract painting can only lie in its composition, i.e. in the quality and distribution of colours. As I showed in my last section, the strong effects of individual colours can be transcended in colour harmony. What Kandinsky calls "inner necessity" may thus be the inner necessity of the composition. Just as a false note in a piece of music is immediately detectable and makes us aware of the necessity with which the notes in the piece follow each other, so colour changes in a painting are also immediately noticeable as "disturbing" or "wrong". (Hence the strong effects of genuinely "ugly" abstract paintings, where the colours have been intentionally composed in disharmony.) So, although the colours in abstract paintings are not placed by the necessity of truthful representation, they are yet only "correct" in particular places on the canvas. In this sense, abstract painting is like a geometrical figure or an algorithm as opposed to an accountancy sheet: It is true only in virtue of its own axioms (while the accounts are truthful in virtue of circumstances external to themselves). And qua axioms the conditions of abstract painting, namely the relations of colours to form and to each other, are irreducible.

The second aspect of abstract painting is its reflection of subjective states of mind. Not only do different people see different "things" in abstract paintings, but the same person can also see different things at different times. Thus the same coloured shapes can sometimes seem to dance with one another and at other times fight each other; they may thus evoke or reflect positive or negative feelings in the perceiver. Again I cannot say how exactly this process works (again a matter for psychologists) but I *can* say that the possibility of abstract painting arousing emotions and thoughts (be they initiated or reflected by the painting) is a clear argument against the reducibility of colour to objective entities which do not arouse such emotions or thoughts.

## 5. Conclusion

The roles that colours play in painting are a clear indicator of the irreducible qualitative aspects of colour. Colours can arouse emotions thus causing subjective feelings, which (arguably) can only stem from subjective aspects within colour.<sup>95</sup> Colour harmony can transcend the purely physical side of this effect for emotion-free (purely spiritual) aesthetic contemplation. The grasping of pure beauty (and perhaps even truth) through aesthetic insight is very difficult to explain unless one allows for irreducible qualitative aspects of colour, which can, for instance, explain how a slight change in colour can turn an exquisitely beautiful painting into a common or even ugly one. Finally, colours can convey meaning, be it by reference to people, events, or ideas, or intrinsically by presenting us with truths about themselves,<sup>96</sup> about the artist or even about ourselves. None of these aspects of colour can be captured in or explained by a reductionist account of colour.

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<sup>95</sup> This depends on one's philosophical position. Anyone who believes that emotions are themselves reducible to (objective) physical states, will simply assume that these states are caused by the relevant physical qualities in colour.

<sup>96</sup> There is probably no better way of understanding colour relations (both internal and external) than the study of painting.

## CONCLUSION

My conclusion is twofold. On the one hand I wish to argue that colours exist independently of human observers. This ontological claim is, however, qualified by the epistemological claim that the nature of colour is determined by the human conceptual framework. The first part of my claim is of the same kind as the claim that the sun exists independently of observers. Colours like the sun have existed before there were human beings on earth and (all else being equal) they will exist should human life cease to exist. My second claim, that colours qua colours are determined by human observers, is an epistemological claim about what we can discover about the nature of colour.

Any discovery is limited by the object of discovery on the one hand (colours will not be discovered to breed in Madagascar), and by the method of investigation on the other. While methods may become more and more sophisticated with time, any object of investigation may still only be known in as far as our conceptual framework can accommodate it. To some extent, however, frameworks change because of new discoveries. Thus the concept "earth" changed considerably when it was proven that the earth was not flat. That the concept "earth" could still be used at all must have been due to the fact that *on the surface* nothing had changed. Thus the concepts up and down, flat and spherical, east and west, etc. still applied. Similarly, we structure the coloured world into light and dark, saturated and nonsaturated, reddish, bluish, greenish and yellowish colours. Different causal explanations of how or why we structure colour in this way do not affect these colour concepts. Invisible wavelengths, for instance, which physically correlate to (at least a subclass of) what we call colours, are not *colours* because we cannot judge whether they are light or dark, saturated or unsaturated, and so on (see also chapters VIII and IX).

This leads to the question whether discoveries about wavelengths will be discoveries about colours. I deny that this is the case. The wavelength theory is a mere *model*. It might be objected that just as it is a *matter of fact* that the earth is round and revolves around the sun and it is simply false to claim the opposite, it might be also a fact that light of the wavelength 640nm is red and simply false to deny this. Furthermore, the correlation of wavelengths with colours might be taken to be a

valuable insight into the nature of colour. But for whom? Perhaps it is because I do not have a good head for figures that I still have to look up which wavelengths correlate to which colours. For me at least, this correlation is completely arbitrary, and if red was correlated with 460 or even 280 nm I should hardly notice the difference. When it comes to the order of colours in the colour circle on the other hand, I have no difficulty whatsoever in remembering which colour is next to which other colour. And this is not due to the fact that I have now studied colour for a few years but rather that I can always reconstruct the circle.<sup>1</sup> Even if physicists may find it easy to remember that the wavelength 640nm is correlated with red because they have a genuine understanding of the nature of electromagnetic radiation, there still seems to be an essential difference between connecting the seen with the seen (red with blue via purple, for instance) and the seen with the unseen (red with 640nm, for instance). I am interested in the former, while scientists are interested in the latter. My conclusion will therefore centre around the necessary relations of the seen with the seen, i.e. necessary internal relations. Whether these relations are ultimately determined by unseen physical qualities of the coloured objects, the perceivers, or both, I cannot decide on, although my conclusion favours explanations which involve both perceivers and objects. (One wonders what it means to say that the *necessity* of the colour relations itself might be grounded in both object and perceiver.)

Two sets of arguments lead to my conclusion. These are completely independent of each other, one resting on common sense and the other on metaphysical premisses. Unless one wants to exclude metaphysics categorically, there is no need to choose between the two arguments, as they both lead to the same result, albeit on different levels: Both combine ontological independence of colour with conceptual dependence on human observers, and both resist the reduction of colour to entirely subjective entities (such as sensations) or objective entities (physical or chemical entities, or complex causal relations between these entities).

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<sup>1</sup> This is related to Wittgenstein's point that we have no difficulties in remembering pure (primary) colours as we can always "construct" them (R.C.III,7,133).

## 1. The Common Sense Argument

### 1.1. Colours exist independently of perceivers: Colour Constancy

It is very difficult if not impossible to explain colour constancy unless colours exist independently of perceivers. If colours were ontologically dependent on *individual* perceivers, there would be no colours when no-one was perceiving them. This would lead to the absurd conclusion that colours would disappear each time someone perceiving them blinked. One would also wonder what made the same colour re-appear each time we looked at the same object. We are not normally surprised to find that most objects have relatively stable colours over long periods of time; on the contrary, we notice when colours change (fading pictures and clothes, renovated paintings, etc.). Furthermore, we can recognise regions and paintings from descriptions given centuries ago and we can tell if colours have changed since those descriptions were first given. So, the idea that colours depend on individual perceivers is counterintuitive.

Even if colour does not depend on individual perceivers, someone arguing for ontological perceiver-dependence of colour might say that colour requires the *possibility* of being perceived. Thus the orchid in the rainforest is red because *if* David Attenborough went to the rainforest he would see a red orchid. This account allows for colours remaining the same over long periods of time and while individual perceivers blink, as there might always be someone who *could* see the colour if he was there.

Yet this account does not solve the logical problem of colour constancy: To say that a certain blue dye does not fade for twenty years is not the same as to say that if someone was looking at it twenty years later he would see the same colour as he saw twenty years earlier. For if we turn the sentence around we arrive at the following statement: "If something looks the same to me as it looked twenty years ago then its colour has not changed." This, however, is not necessarily true for I might have had an accident resulting in colour-blindness.

One way of avoiding this problem, is to include a *ceteris paribus* clause in the argument, such as "provided my vision has not changed". But this means that we require a criterion for what counts as change of vision; and change of vision can only

be defined with reference to a stable (i.e. viewer independent) world (see also chapter IX). Furthermore, the possibility of colours changing entails the possibility of colour constancy, whether both concepts are defined with reference to perceivers or not. But colour change and colour constancy require a criterion for colour identity over time. This criterion cannot be the perceptual experience of individuals, for if I insisted that a colour had remained the same for the last twenty years, while someone else insisted that it had changed, we could only settle our dispute by some objective criterion, such as a photograph of the original colour for instance (on the condition that the photograph captured the colour perfectly at the time and had not faded itself). Another objective criterion might be the reflectance of the colour measured at the time under laboratory conditions, a measurement which could be repeated after twenty years.

In a dispute about colours, someone arguing for perceiver-dependence of colour has to take the judgment of a colour expert to be the decisive criterion, where the colour expert would not be allowed to use any means of identifying the colour other than looking at it. Yet the notion of a colour expert only makes sense if we believe that colours exist objectively (in the sense of being perceiver-independent): We call a person an expert if that person can identify what we know by independent means to be of a certain quality; otherwise the notion of an expert does not make sense (we do not call someone in great pain an expert of his pain, because he is the only person who can feel this pain).

Thus colour exists independently of perceivers because perceivers use colours themselves as criteria for colour judgments. Also, scientific measurements of spectral reflectance, energy flux and other physical properties of colour only make sense if there are colours the properties of which can be measured.

## 1.2. But the nature of colour is bound to human thought

The argument from colour constancy establishes the existence of colour independently of observers, but it does not establish *what* colours are. It allows for physical and chemical reduction of colour to other entities, as well as for more unusual explanations of colour, such as colours being the "deeds and sufferings of light". I now wish to argue that the nature of individual colours can only be understood with reference to human thought.

The first difficulty for anyone denying that the nature of colour depends on human thought, is to explain the cultural differences between colour concepts. That emotional and aesthetic aspects of colour are at least partially culturally determined can be seen in cultural differences of colour symbolism and colour fashion. Other aspects of colour are universal, such as the receding nature of blue (see chapter X). I therefore distinguish between aspects of colour which are purely subjective and hence differ from culture to culture or from individual to individual, and those which are universal but nevertheless anthropocentric.

### a) External, cultural influences on colour concepts

That the nature of colour can be determined by our conceptual frameworks<sup>2</sup> becomes apparent when we look at what counts as a colour. White, black and grey count as colours in some contexts (such as flags, clothes, wallpaper, cars, etc.) but not in others (photographs, film, painting). Also, football colours, orange and green in Northern Ireland, and the colour of the human skin, are all relevant in some circumstances but are ignored in others. The use of these colour concepts thus depends on contexts which are external to and independent of the colour concepts themselves. Thus it is entirely contingent which colours are relevant in which contexts. Even if most conventions for the use of particular colours can be historically justified, they still depend on issues external to the colour space. A purely objective account of colour will have difficulties

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<sup>2</sup> These conceptual frameworks are the same as what Wittgenstein calls "language games"; I prefer the term "conceptual framework" as it seems less specific to just one philosopher.

in explaining these colour concepts (and will probably dismiss them as "folk concepts").<sup>3</sup>

#### b) Necessary Internal Relations

The necessary colour relations which form the framework of our colour concepts are not affected by changes of context. As I demonstrated in chapter VIII, most colour spaces show the same colour relations even if they set different priorities (which again are based on factors external to colour).<sup>4</sup> These internal relations are necessary (see chapter VIII), and I shall now say why they are irreducible.

First of all, the necessary status as such is irreducible. Although I like to believe that there are necessary relations in nature which philosophers and scientists can discover, I reluctantly accept the stronger arguments by Hume, Kant, Schopenhauer, Wittgenstein (*Tractatus*) and many other philosophers that necessity itself depends on the logical structure of human thought. This leads to the question of how to explain the logical structure of human thought. For as with Hardin's subjectivism we might be able to explain structures of thought with reference to the physical make-up of the brain which in turn could be explained with reference to general physical laws. But as this is only possible by using the faculty of human thought, I believe this question to be ultimately unanswerable: We can only grasp laws of nature with our human faculties, and hence all laws of nature conform to the structures of human thought, i.e. can be expressed in terms of human concepts. I am fully aware that this is not a satisfactory answer regarding the status of necessity of colour relations. But a full answer could only be given after a thorough investigation into the nature of necessity as such, and this in turn goes beyond the scope of this thesis. All I can say is that colour relations are

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<sup>3</sup> Please note that Goethe, Schelling, and especially Hegel are able to explain these concepts because their accounts are not purely objective. Hegel's account is particularly successful because of Hegel's emphasis on history. On the other hand, all three accounts are at least partially outmoded, which shows how much their own ideas are culturally determined.

<sup>4</sup> Thus it is not the nature of colour itself that makes the pharmacist use a different colour space from the decorator and the artist a different one from the physiologist, but the purpose for which each of these people uses colour.

just as necessary as other internal relations are (geometrical relations for instance). It remains deeply puzzling why exactly the statements "yellow is darker than blue" or "red is closer to green than it is to yellow" are necessarily false, but it is clear that our colour relations would not be *colour* relations if they were any different from what they are (see chapters VIII and IX).

Statements such as "blue is darker than yellow" are a priori true and even analytical in a broad sense: The statement "blue is darker than yellow" is a priori true because it is "true without reference to experience, except in so far as experience is necessary for the understanding of its terms".<sup>5</sup> This means on the one hand, that it is true for any material which is yellow or blue (all else being equal - a very whitish-blue would of course be lighter than a very dark yellow or brown), but on the other hand it also means that it is *not* necessarily true for someone colour-blind, as someone colour-blind does not have the experience necessary for understanding of the concepts in this statement (see chapter IX). Hence colours are not Kantian innate a priori concepts, but are a priori in the broader sense given above.

In how far statements about the internal relations of colours are analytic depends on how broadly we understand the notion of analyticity. That blue is darker than yellow is true in virtue of the meaning of the words "blue", "yellow" and "darker than", but one would hardly be able to formulate a number of definitions for these three terms, from which the statement "blue is darker than yellow" could be logically deduced. "Darker than yellow" cannot be understood as a predicate of blue because otherwise we would require a whole list of similar predicates for each colour and this is not the way our colour concepts are organised.<sup>6</sup> The difficulty of assigning synthetic or analytic characteristics to colour statements derives from the essentially three-dimensionality of our colour space, which requires a two-dimensional shape as basis (a

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<sup>5</sup> A.Flew, *Dictionary of Philosophy*, London, 1979, p.16.

<sup>6</sup> Blue, for instance, would have the predicates "darker than yellow", "darker than red", "about the same darkness but slightly darker than green", "darker than all mixtures of the above colours", ..., also "closer to green than to red or yellow", "closer to red than to yellow", and so on. If we add white, black and grey to this list as well as all mixed colours we will arrive at a very extensive list indeed. What this list really does, however, is to give a description of the form often found in riddles ("If X sits next to Y and Y is opposite Z and..."). Like the riddle it describes spatial relations of a situation which can much more easily be represented by a drawing. Similarly, all our colour relations can be represented in a colour space.

hue circle, triangle, square or other two-dimensional shape). Analyticity in the narrow (Fregean) sense, however, is an essentially linear (arithmetic) concept which requires meanings to be contained in words, in the way that small numbers are contained in bigger numbers.

In conclusion, colours cannot be purely objective in the sense of being reducible to quantifiable objective entities such as wavelengths or particles for the following two reasons: First, our individual backgrounds make us use different colour concepts in different situations, and this in itself is difficult to explain by a purely objective account. More importantly, however, colour relations are irreducible to causal relations between quantifiable objective entities, because they are internal relations and hence their necessity is determined by human thought. Thus the fact that red and green are fundamental complementaries, for instance, cannot be explained by reference to chemical reactions in our eyes/brains because in an important sense the fact that red and green are complementaries is *primary* to the fact that certain chemicals may cause us to see red or green but never both at the same time. Thus in a different world the physical causes could be different ones, but in all possible worlds red and green will be complementary colours (provided there are to be colours at all in that world - for there could be a monochrome or even non-coloured world such as the ones inhabited by colour-blind and blind people).

## 2. A metaphysical account:

### 2.1. The Objective Existence of Colour:

How the existence of colour can be deduced purely by reference to light and darkness, which themselves are assumed to exist independently of observers.

#### Premisses

1. Everything is either ideal or real in the following sense:

ideal = eternal, non-changing, non-perceivable - can only be grasped by thought;

real = becoming (i.e. not eternal, changing), perceivable - can be grasped empirically with our senses (and the aid of scientific instruments).

2. The ideal is essentially identical with itself and hence exists independently of other things. The real is essentially different from other real things and hence exists in relation to other things.<sup>7</sup>

3. Anschauung (contemplation/intuition) can unite the ideal and the real by "seeing" the ideal in the real (see also ch.V).

#### Application to colour:

1. Light is ideal<sup>8</sup> - it is invisible and can only be grasped by thought. Darkness is the ideal (conceptual) opposite of light - it too is invisible. Turbidity is real - it is visible and by its visibility is opposed to both light and darkness, in the sense in which the real is opposed to the ideal; light and darkness appear in the real world (materialised in the medium of turbidity) as the colours white and black (see chapter VII).

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<sup>7</sup> I am aware that everything is identical with itself, but the point about ideal things is that they are identical with themselves and nothing else, whereas real things are identical with themselves but also in causal relations to other things so that real things can be extensively defined by other real things, while ideal things must be self explanatory.

<sup>8</sup> The light here referred to is what I called "light-in-itself" (ch.VI).

2. The object of visibility<sup>9</sup> is always turbid (i.e. not perfectly transparent) and coloured (because everything non-transparent is coloured).<sup>10</sup> So, turbidity and colour necessarily co-exist, even though conceptually they are different from each other.

We see the opaque parts of turbidity (as the transparent parts are by definition invisible). Colour is thus the total of the opaque parts of turbidity and hence a boundary between us and whatever lies behind these opaque parts (this is most obvious in the case of perfect opacity: surfaces).

Colour thus forms the visible boundary between light and darkness. With regard to opaque objects we are always on the light side of them and do not see what lies behind the surface of the object, so that colour forms a very obvious boundary between us and the invisible. (We are naturally "enlightened" about the surfaces of objects but "left in the dark" regarding their qualities beneath the surface.) Coloured transparencies on the other hand, can be held against the light or against objects (i.e. darkness). If held against the light they occlude parts of the light (weaken a white light source), held against objects they occlude parts of the objects (make us not be sure about the colour of the object, and even occlude very light transparent objects altogether). Although coloured transparencies do not appear as boundaries themselves (provided their edges coincide either with their background or with our visual field) their colours merge with the coloured boundaries of the objects seen through them, so that again we see boundaries and not the coloured transparency between us and the surface<sup>11</sup> (see also chapter VII). Boundaries are real not ideal, because ideality is identity with itself and, by definition, boundaries establish differences.

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<sup>9</sup> Although I am trying to give an account of colours independent from observers I use the notion of visibility as an essential aspect of reality. I am aware that the concept of visibility itself requires perceivers, but do not think that this stands in the way of the argument, because the distinction I am making is the classical one between the world of appearance (what I call "real" is thus the empirically real) and the world of true and eternal things (what I call the "ideal world", which in Platonic terminology is of course the only real world). So, as the whole of empirical reality requires human observers I can argue that colour *like everything else* requires human observers but does not depend more on perceivers than other things in the empirically real world.

<sup>10</sup> I take this to be obviously the case.

<sup>11</sup> Someone might object that we see the red light in a room with a red light bulb. I believe that this is only true, if the air in the room is not perfectly clear (if it is smoky or steamy), in which case we get the impression of an ever so thin red fog, which we notice as being in the way between us and the objects in the room.

3. Anschauung (intuition/contemplation) can unite the ideal and the real by "seeing" the ideal in the real.

The process of Anschauung is a seeing of a perfect form of something which itself is merely real and hence imperfect. Colour as the boundary between light and darkness is an especially good example of how the ideal can be seen in the real: In the empirical world, boundaries inform us about the shape and possibly the quality of whatever lies either side of them. (Thus the colour of a shining red tomato tells us both about the quality of the fruit and about the lighting conditions it is seen in). But colour is not merely a useful indicator in the empirical world, but also one of the most suitable media for an Anschauung of the ideal, because colour contains the ideal (light) within itself. Artists, for instance, can express ideals (such as beauty, truth, religion) using real, material, colours.

The necessary internal relations between colours form a second kind of ideal which can be grasped in painting. As an argument for colour objectivity, Anschauung is the possibility of transcending the world of appearances by means of colour, which hence must be at least partially independent of observers, as nothing wholly subjective could lead us out of subjectivity towards pure (ideal) objectivity.

To conclude, this metaphysical account claims that the ideal opposition of light and darkness manifests itself in real turbidity which is relatively dark or light and relatively transparent or opaque and always coloured. Turbidity may thus be called the real substance of colour. As every colour is necessarily turbid and everything turbid necessarily coloured, and as furthermore turbidity is independent of observers as it only depends on light and darkness (matter) for its existence, it follows that colour exists independently of observers and is real and objective.

But because colour and turbidity are co-extensive, this "metaphysical argument" by itself offers no reason why colour should not be reduced to turbidity - which itself is visible and more or less dense matter. This account by itself is therefore a materialist account of colour, unless one makes it part of a wider framework or proves that in itself it is insufficient.

## 2.2. Limitations of the metaphysical account.

As Goethe, Hegel and Schelling demonstrate, the metaphysical account can be extended to explain individual colours and colour relations. But it generally fails to do so satisfactorily because it either relies on personal intuitions or on holistic systems too vast to serve as useful accounts for someone merely interested in colour.

In Goethe, Hegel and Schelling the metaphysical account continues more or less in the following way:<sup>12</sup> Turbidity is a visible medium of light and darkness, both in the sense that it makes light and darkness visible and in that it is the medium of visibility as such, which requires the opposition of light and darkness but is always darker than light and lighter than darkness. Individual colours depend on the density and extension of the medium (a broad medium appears denser than a narrow medium of the same material) and on the spatial relation of the medium to light, darkness and perceiver, for the same medium may be blue on one side and yellow on the other.

Individual colours are explained in the following way: White and black are the pure visible representatives of light and darkness (see chapter VII). Blue appears on the dark side of the medium and yellow on its light side. Thus the dark side of a dense medium such as fog will appear blue (as the light from the other side hardly travels through the fog) and blue will also appear on the light side of a thin medium, such as glass, over a dark background. Yellow appears on the light side of a thick medium such as fog, because the darkness can hardly be seen through the fog; and yellow appears on the dark side of a thin medium held before the light, such as glass.

This account assumes a linear relationship between dark and light (visible as black and white), which yields blue and yellow. As the turbid medium or the light intensities change the two ends meet in the middle. Goethe's theory that red comes into being when the forces are increased, and green as equilibrium when they are weakened, is not supported by any strong evidence and, although beautifully expressed in his own writings, may be disregarded as absurd. As I hope to have shown in chapter VIII, our colour space is three-dimensional and can thus not be deduced from a bipolar line.

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<sup>12</sup> For the purpose of the argument I shall neglect differences between the three accounts.

One way out of this problem is to add another external dimension such as temperature. This makes it difficult to argue for pure ideality of light and dark, however, as light is then no longer identical with itself but stands in a causal relation with temperature. It may yet be possible to give a consistent metaphysical account of colour, but that requires a system as vast as Hegel's.<sup>13</sup> For once we include other polarities such as hot and cold we will find it hard to explain colour without explaining everything. I therefore conclude that there *could* be a complete system which explains both the existence of colour and the characteristics particular to individual colours. Both Hegel's system as given in his *Encyclopedia* and the whole of modern science could be two such complete systems. This may seem to be a strange coincidence, but really it follows from the fact that Hegel and modern scientists both believe that there are necessary truths in nature which we can discover. Like Goethe, I myself want to believe that this is indeed the case. Like Goethe I even have strong emotional and aesthetic reasons for hoping that there are necessities in nature which we can grasp. But like Goethe I am also convinced that a good and clear account of colour relations can be given independently of the status of its necessities. So while I find metaphysical accounts such as those of Hegel and Schelling far more interesting than the common sense one of Wittgenstein for instance, they prove to be less useful as a means of explaining colour because of their vast interconnections and metaphysical baggage. Similarly, scientific accounts require a vast knowledge of scientific backgrounds to offer genuine insights into the nature of colour (because, as I argued above, the mere fact that red is correlated with the wavelength 640nm for instance, means very little on its own).

Goethe's *Farbenlehre* lies somewhere between all of these accounts. Torn between idealism and realism, between poetic feelings and joy in empirical discoveries, Goethe avoided the philosophical decision for one philosophical system. Although I hope to have made at least some of the philosophical implications clearer than he has, I can see that this thesis might be criticised for the same reason. Yet I do find merit in the fact that we may learn something to be true without having to interpret this fact in only

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<sup>13</sup> Please note that modern scientific accounts of colour rely on just as vast a system as Hegel's account does, often including the greater part of late twentieth century theory in physics, chemistry and physiology.

one way. It could well be a strong advantage for philosophy if more subject matters were investigated by themselves before they are presented to the scrutiny of philosophers and scientists for explanations and justifications.

### **3. Colour as Unity of Subject and Object**

Within this thesis I hope to have shown that because colour relations are necessary they are irreducible to invisible particles obeying physical laws. For I believe that, firstly, physical laws ultimately depend on the same logical (subjective) necessity our colour relations are part of and hence have no greater explanatory value. This rests on the uncomfortable supposition that physical laws are not objective necessary truths which we can discover. As I said above, I am not quite happy with this answer myself, but for now find the arguments in its favour more convincing than those of its opponents. Secondly, I believe that colours are better explained by looking at colours and their relations than by theorising about invisible entities. This philosophical attitude can partly be explained by my scepticism about the informative value of physical explanations and partly by the fact that we require basic colour concepts to know what it is that we want to explain or reduce. Logically, basic colour relations as represented in a colour space are thus primary to physical explanations or reductions.

For the sake of the argument, however, let us assume that we have found a complete account of colour vision which reduces all colour relations and all processes involved in colour vision to underlying physical causes (much like Locke envisaged it). Suppose also that this account can indeed explain our colour relations. Such a complete causal account must involve both external colour (physical input) and perceiver (physiological processes). As a complete account it could in principle be implemented on a computer and it would pass a colour Turing test. Let us further assume that the computer could perform complex representational tasks, such as taking the effect of blue as a distant colour into account. As a computer is in principle able to decode even as complex images as paintings it could well pass the Turing test in an art college. What it will always lack, however, is the *understanding of the effect* of paintings (even if it could predict the effect certain paintings might have on human beings in different

frames of mind), because a computer lacks what Goethe calls the "physiological colours".

The subjective and active production of colour in our eyes is contrary to the whole being of a computer, as computers are by definition objects and hence neither subjective nor active but merely functional.<sup>14</sup> The activity of the eye however is the *subjective* completion of the colour circle and our means of judging colour harmony and disharmony, even to the extent of strong moral and aesthetic effects. Leaving aside their differences regarding the nature of subject and object, Goethe, Hegel and Schelling agree on colour being a form of unity between subject and object: For Goethe the subjective activity of the eye reflects the objective activity of the sun within us. Hegel treats colours as synthesis of subjective (ideal) light and objective (real) matter, and Schelling similarly as their indifference. All three thinkers explain the role of in painting as a means of transcending the material of paint and canvas with reference to this intrinsic duality in colour itself.

Colour can neither be explained by subjective idealism nor by eliminative materialism, as both of these theories deny one essential aspect of colour: the subjective idealist cannot explain colour constancy and the eliminative materialist cannot explain the necessity of colour relations or the aesthetic effects of painting. Furthermore, the subjective aspects of colour cannot possibly be reduced to objective entities nor the objective properties to subjective ones, as subjectivity and objectivity are themselves necessarily irreconcilable.<sup>15</sup>

While I have not produced a theory of colour myself, I hope to have clarified why the nature of colour itself facilitates a great variety of colour theories. There is certainly more to colour than meets the eye: colour is as much within us as it is external to us. The possibility of painting transcending the material of paint and canvas is the more beautiful argument for my thesis, but the necessity of colour relations which are formulated with reference to public colour samples already shows that colours must be some kind of unity of subject and object.

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<sup>14</sup> If a computer was not completely object it could not be used in reductivist arguments.

<sup>15</sup> See also S.Priest, "Newton and Hegel: Can Science explain the Scientist?", in Petry, 1993, pp.115-123.

## 1. Notes on Some German Words

**Anschauung:** In philosophical contexts, the word "Anschauung" is usually translated as "intuition". "Anschauung" has the connotation of personal experience, and the adjective "anschaulich" denotes characteristics of reports or explanations such as "clear", "vivid", "graphic", i.e. as if you had *seen* it yourself. The concept of "Anschauung" is hence often closer to the process of contemplation of objects than the more internal process of intuition. This is also illustrated ("made anschaulich") by the etymological connection with the English word "show".

**Betrachtung:** "Betrachtung" is often also translated as "contemplation". It is generally a more organized kind of contemplation, and can also mean "examination". The word "observation" is probably the best translation.

**Erkennen, Erkenntnis:** "Erkenntnis" is usually translated as "knowledge", which is fine considering that the German word for epistemology, the theory of knowledge, is "Erkenntnistheorie". Scientific "Erkenntnisse", however, are "scientific discoveries or findings" which stem from the act of "erkennen" - to perceive, make out, recognize, identify, acknowledge. Julian Young prefers the translation "cognition" which is also used in standard translations of Kant's works. In the connection with colour "eine Farbe erkennen" is best translated as "to identify or recognize a colour". The Scottish word "ken" clearly shows the connection of "Erkenntnis" to both "can" (können) and "know/be acquainted with" (kennen). The German word "Kunst" (art) is also related.

**Erscheinung, Erscheinen:** While the translation of "Erscheinung" as "appearance" is usually adequate, one should beware of contrasting it with "reality". Although "Erscheinung" can mean "apparition" or "vision", the primary German connotation of "Erscheinung" is not only the outer appearance of someone or something, but also its connection with (rather than contrast to) reality. Thus "in Erscheinung treten" is "to become manifest", and "Erscheinungsform" is "manifestation". In relation to Goethe in particular, it is interesting to note that "Erscheinung" can often be translated as "phenomenon" (with reference to events: "a common phenomenon" - "eine häufige Erscheinung") or "symptom" (as in symptoms of illness); these translations again show the relation of "Erscheinung" to reality, with "Erscheinung" being the outer manifestation of reality. Altogether "appearing" might therefore be a slightly better translation than "appearance", if it was not for the German grammatical equivalent of "Erscheinen".

**Farbenlehre:** The word "Lehre" can be translated as apprenticeship, doctrine, theory, lesson, teachings. Goethe's *Farbenlehre* contains aspects of all of these, but especially of an apprenticeship. The three volume work describes the work of Goethe rising from apprentice to master (it is his "Meisterstück") and at the same time it teaches us and asks us to do a similar (but not the same) apprenticeship. The translation "Theory of Colour" is unsuitable because Goethe insists that it would be wrong to have a theory of colour as long as the word "theory" has the connotation of "system" or "doctrine".

**Gemüt:** Best translated as "heart and soul", the "Gemüt" comprises both spiritual and emotional feelings, and has hence come to refer to the nature or disposition of a person as a whole. When Goethe or the German Idealists speak of a piece of art that "rührt" or "regt das Gemüt" they mean something that reaches our innermost being, both spiritually and emotionally. One might say that the "Gemüt" is the sum of our subjective states.

**Steigerung:** "Steigerung" is both increase and intensification. I shall use the translation "intensification" to stress the qualitative aspect of it.

**Stufenfolge:** literally a series of steps; also stages of development. I shall translate "Stufenfolge" as "hierarchy" to emphasise the qualitative aspect of getting higher as you climb steps. This may not be a good translation but I cannot think of a better one.

**Trübe, trüb:** The adjective "trüb" is contrasted mainly with "clear" (murky water, cloudy liquid, muddy puddles, dirty glass and dull eyes can all be described as "trüb") and with "light" (dim light, dull weather, grey or overcast skies, dull or dingy colours). It can thus be used figuratively as "gloomy" (mood, voice) or "dreary" (time). In its literal sense "Trübe" describes the degrees of opposition to light and clarity. Thus it may describe any state between perfect light and total darkness ("totale Trübe"), as well as any state between perfect transparency and total opacity (again "totale Trübe").

**Vorstellung:** the verb "vorstellen" literally means "to stand something forward", ie. "to put forward", hence "to introduce" and also "to represent". The reflexive form "sich etwas vorstellen" means "to put something before one's mind" - "to imagine". There is an obvious philosophical connection to the theory of representation, but in connection with Schopenhauer I find the words "to present" and "presentation" more suitable than "to represent" or "representation". The word "re-presentation" might suggest a process in which we perceive the world as it is and then re-present it. Schopenhauer's "Welt als Vorstellung", however, is always presented to us through our senses and our brains, so that perception and representation are one and the same thing. "Vorstellung" can also mean "presentation" in the sense of "performance". Thus "die Welt als Vorstellung" is not the real world as it is in itself but only a performance for human comprehension.

**Wesen:** Wesen can be translated as "essence", "nature", "being" or "character". "Being" and "essence" sound too abstract in English and have too many non-Goethean philosophical connotations to be used. The word "character" captures the notion of the "Wesen" of people well but sounds strange when used in connection with plants or stones. So despite the possibility of confusion with outer nature ("mother nature"), I shall use the translation "nature". After all Goethe wants to show how the inner nature of a being is one with outer nature. To avoid confusion I shall however add the German word wherever necessary ("nature (Wesen)").

**Wirklichkeit:** There are two translations for the words connected with this concept:

1. wirken, die Wirkung: to act, have an effect on; the effect.
2. wirklich, Wirklichkeit: actual, real; reality.

How the two are connected is best shown by Schopenhauer:

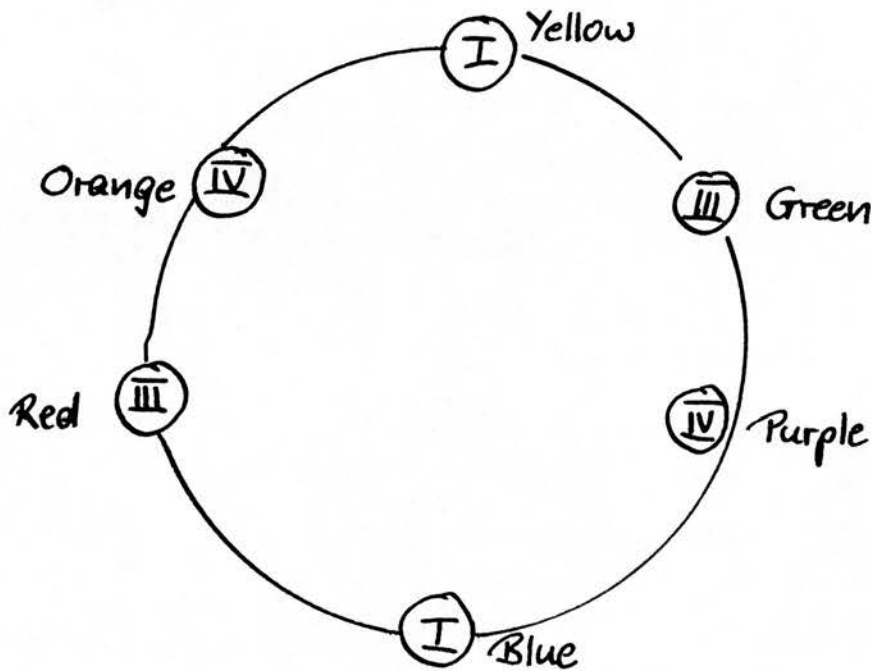
"To be [sein] is generally synonymous with to act [wirken]; accordingly, in German, everything that *is*, is very strikingly and with unconscious profundity called *actual* (*wirklich*), that is, acting (*wirkend*)." <sup>1</sup>

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<sup>1</sup> "Sein ist überhaupt mit Wirken gleichzusetzen: daher auch im Deutschen und mit unbewußtem Tiefsinn alles, was *ist*, *wirklich*, d.i. *wirkend* genannt wird. [ÜS&F, §1,p.21]

## 2. Kandinsky's Polarities

In *Über das Geistige in der Kunst* Kandinsky establishes two pairs of colour oppositions, the first one of which shows inner character as effect on the soul ("innerlichen Charakter als seelische Wirkung"), whereas the second one is "of physical character, as in complementary colours" ("physikalischen Charakters, als Komplementärfarben"). Together the two oppositions form a circle or ring between two poles, which Kandinsky sees as "the life of simple colours between birth and death" ("das Leben der einfachen Farben zwischen Geburt und Tod").



(The Roman numbers denote the pairs of oppositions; from Kandinsky, *Über das Geistige in der Kunst*, 1951, p.105)

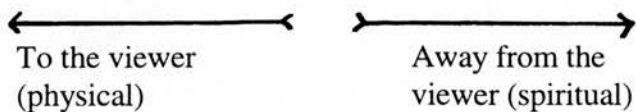
First Pair of Oppositions (I and II)

(inner character as effect on the soul)<sup>2</sup>

I      WARM                                  COLD                  I. Opposition  
         YELLOW                                BLUE

*Two movements*

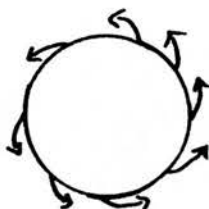
1st horizontal



2nd excentric

&

concentric



II      LIGHT                                  DARK                  II. Opposition  
         WHITE                                BLACK

*Two movements*

1st the movement of resistance

Eternal resistance & yet possibility (birth)



Absolute lack of resistance, and no possibility (death)

2nd excentric & concentric

(as yellow and blue, but in rigid form)

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<sup>2</sup> Kandinsky, *Über das Geistige in der Kunst*, p.89.



### 3. Johann Leonhard Hoffmann

Hoffmann gives detailed parallels between colour and music in his *Versuch einer Geschichte der malerischen Harmonie überhaupt und der Farbenharmonie insbesondere, mit Erläuterungen aus der Tonkunst und vielen praktischen Anmerkungen* (Halle, 1786; in HA14 (1989, p.246). I agree with Goethe's criticism of the way in which the natural appearances of colour and musical tone are arbitrarily categorised into parallels unsuitable to their nature, but like him recommends the list, both as negative example and also as delightful entertainment:

Light (Licht)	Sound (Laut)
Darkness (Dunkelheit)	Silence (Schweigen)
Shadow (Schatten)	
Lightbeams (Lichtstrahlen)	Soundbeams (Schallstrahlen)
Colour (Farbe)	Tone (Ton)
Colourbody/object (Farbenkörper)	Instrument (Instrument)
Pure colours (Ganze Farben)	Full tones (Ganze Töne)
Mixed colours (Gemischte Farben)	Half tones (Halbe Töne)
Broken/refracted colours (Gebrochene Farbe)	Deviation of tone (Abweichung des Tons)
Lightness (Helle)	Height (Höhe)
Darkness (Dunkel)	Depth (Tiefe)
Colour series (Farbenreihe)	Octave (Oktave)
Repeated colour series (Wiederholte Farbenreihe)	Several octaves (Mehrere Oktaven)
Chiaroscuro (Helldunkel)	In unison (Unisono)
Heavenly colours (Himmliche Farben)	High tones (Hohe Töne)
Earthly (brown) colours (Irdische (braune) Farben)	Bass (Kontraltöne)
Dominant tone (Herrschender Ton)	Solo voice (Solostimme)
Light and half shade (Licht und Halbschatten)	First and second voice (Prime und Sekundstimme)
Indigo (Indig)	Violoncello (Violoncell)
Ultramarine (Ultramarin)	Viola and violin (Viola und Violine)
Green (Grün)	Human voice (Menschenkehle)
Yellow (Gelb)	Clarinet (Klarinette)
Bright red (Hochrot)	Trompet (Trompete)
Rose red (Rosenrot)	Oboe (Hobo)
Carmine (Kermesrot)	Transverse flute (Querflöte)
Purple (Purpur)	French horn (Waldhorn)
Violet (Violett)	Bassoon (Fagott)
Preparing the palette (Zurichtung der Palette)	Tuning the instruments (Stimmung der Instrumente)
? (Traktement)	? (Applikatur)
Colour wash drawing (Bunte lavierte Zeichnung)	Piano concerto (Klavierkonzert)
Impasto painting (Impastiertes Gemälde)	Symphony (Symphonie)

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- Landschaftliche Malerei. (1818)
- Zu malende Gegenstände. (date unknown)

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<sup>1</sup> Although Eastlake's translation was praised by Schopenhauer (§14, p.289; Payne, p.76) I often only used it as a guidance towards my own translations. Eastlake's text is fluid but in my opinion is not always sufficiently literal to capture what Goethe is saying.

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