Periodic colour model

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This article is based on the thesis that natural cycles have an ontological influence on our symbolic meaning system and classification of notions. Lately, these symbolic meanings have passed over to colour meanings along with the evolution of a visual system. Colours are one kind of human convention, used unconsciously in every day communication. At the macroscopic level, sunlight is the only source of light which defines those natural daily- and annual-cycles. These two cycle systems symbolically correspond with two basic geometric sequences of colour palettes, forming major- and minor-angled colour circle lines. Inserted into the Periodic Colour Model they explain the logic of dominant colours and the relationships among them at the specific cross-section of periods. In the Periodic Colour Model, all three dimensions of colour are summarised, including time in a common model which represents a complex analytical and prognostic tool based on symbolic values transmitted from natural cycles.

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Introduction

The phenomenon of colours is complex and multilayered. Basically, it is divided into objective and subjective parts, but the subjective part is slowly diminishing with every new scientific interpretation, explanation, proof and discovery. The understanding of colour matching and trichromacy resulted in the new science of colorimetry that in turn led to the introduction in 1931 by the CIE (Commission Internationale de l'Eclairage) of the coordinate space XYZ. The background for that model was founded in 1905 by Münsell's categories of hue, value and chroma. In 1976 the CIE introduced an additional system called CIELAB based on $L^*a^*b^*$ coordinates [1]. The field of optics and physiology of colour perception, detection of spectral light, conversion of optic stimuli and their conduction by means of coded quantum packages to the cortex, as well as the mechanism to see colours and images, are already well studied [2,3]. In this context, it is worth mentioning the phenomenon of Hering's opponent colours, which is the basis of several natural colour systems such as Munsell, NCS, Kueppers or Nemcsics' Coloroid, etc. [4-7].

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In addition, the atomic-level of colour phenomenon includes the macroscopic aspect, within which the influence of the sun and sunlight upon the formation of periodic meteorological and seasonal changes is precisely defined. These changes can be observed in everyday life and are a part the naturally-occurring daily, monthly, seasonal and/or annual cycles [8,9]. Weather conditions are being increasingly understood due to huge amounts of scientific data, provided by different scientific disciplines, but the relationships between natural cycles and colours remain unresolved. This area also includes the relationship between the significance of certain stages in natural cycles and the semantics of individual colours.

Colours occur gradually throughout each civilisation as elements of the culture of being. On the contrary, if we are unaware of colours, we are unable to name them, meaning that they do not exist. In children unbridled colours are used, unarticulated and inadequate according to their true meanings. Later, the meaning of colours is gained by learning. The gradual development of colour perception in different civilisations was briefly described by Berlin and Kay [10].

The idea of colour relationships to natural cycles first occurred to me during my study years on Academy of Fine Arts in Ljubljana, Slovenia between 1968 and 1972, whilst studying the art works of Paul Cezanne and Paul Klee. Research was carried out into the mental principles of art work formation and which unravelled the logic of how the colour tones were applied one after another. In the formation process of the Paul Klee's painting from the late 1930s, *Signes en Jaune* (translation 'Signs in Yellow') [11], it is considered that he started to paint early in the morning, putting first light yellow tones and gradually over time passing more and more warm yellow ones, and after that orange and red–orange at the end of midday. This gradual order of progressively warmer colours being applied during the course of the day, lead me to the conclusion that colours correlate to a warmer phenomena in natural cycles. These principles are even more evidently exposed in aquarelle techniques where transparent colour tones are applied in clearly time-dependent layers.

The general aim of this present study is to explain the meaning and importance of each step from natural daily and annual cycles to the development of colour circles, and the importance of angles amongst the systematisation of colours from major to minor. The article outlines the constitution of the 'Periodic Colour Model', which is based on a colour dominance system.

Natural Cycles as Ontological Background

Marco level

During the evolution of the human eye, ever-repeating natural cycles had an influence on its development. In addition, specific cross-sections of this cycle phenomena also influenced perception in the form of natural symbolic classification. Constantly changing light conditions have, therefore, already had a million years as a natural basis of colour perception experience. This macro aspect also has a major influence on later colour systematisation, which is based on two principles: on the twelve levels of grey-scale in the daily cycle and on the seven levels of grey-scale in the annual cycle (see next sections). The presence of these two major cycles has an almost invisible influence on our unconscious perception. However, we know that there are differences between the colour atmospheres of early morning and evening or winter and summer days, for instance. The colour palettes are different but our adaptation ability convinces us that we are observing the same colours, because the colours are also a type of symbolic convention in our understanding and interpretation of what we are observing and seeing. In that sense, natural cycles play an important role in the organisation of colour circles.

Daily cycle

The daily cycle encompasses 24 hour, during which the Earth rotates 360° along its axis in its helix continuum [12]. The brightest and lightest point is around noon and the darkest around midnight (Figure 1), which means that the weakest illumination emission is around midnight on one side of the globe and the highest illumination emission around noon on the other. This means that for the 24 hour daily cycle, there is symmetry for 50% of the time and, therefore, it remains actually that there are only twelve different gradual steps of received illumination emission what is interpreted as twelve achromatic levels of grey-scale, from white to black inclusively.

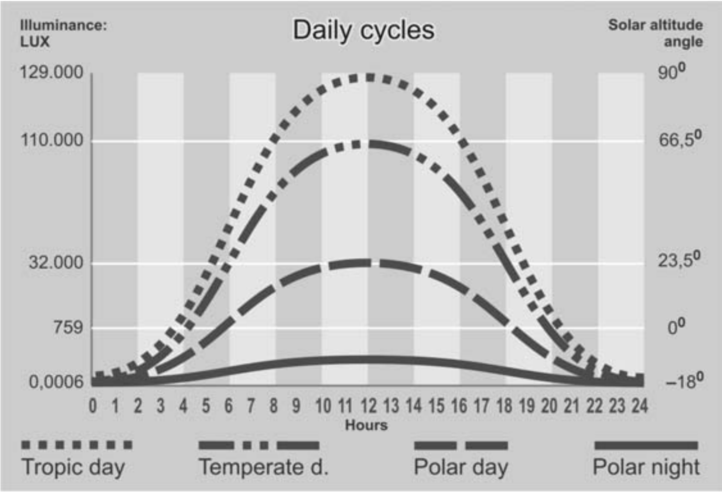

Figure 1: Around noon is the highest illumination emission and around midnight the weakest, but in correlation to solar altitude degree, the whole energy amount varies strongly with latitude.

However, in correlation with the solar altitude degree of illumination, the total amount of energy varies strongly according to geographic latitude (Figure 2), and the annual mean temperatures show us clearly the shapes of different zones of the globe which are modified by the influence of the geographical heterogeneous configuration of the ground, whether it is ocean or land, mountains or desert, etc.

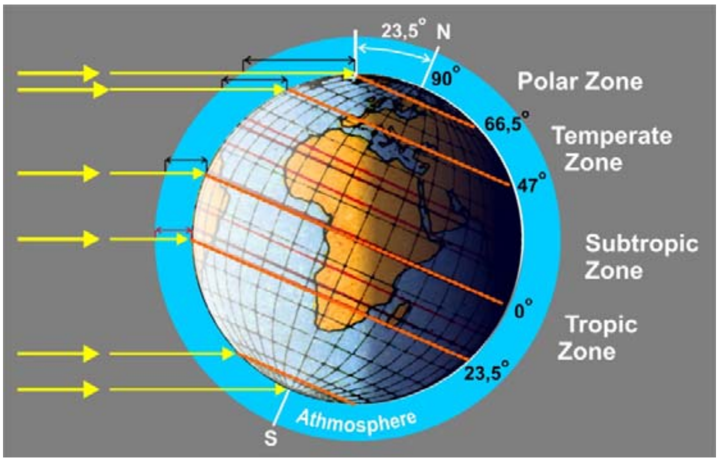

Figure 2: Correlation among altitude degree of illumination emission and climatic zones.

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The whole geometry of the phenomena is based on the Earth's rotation along its axis in helix continuum on the ecliptic rail around the Sun. One complete rotation means one day and night period and that part means *ca*. 1° in the whole realm of the annual cycle. The phenomena can be summarised based on two possible interpretations:

– (i) the simplest division of the daily cycle split into two extremes: day and night, interpreted as white–black (W–K); or

– (ii) a more advanced division resulting in a twelve-level grey-scale (Figure 3). The symbolic summary of the daily cycle is correlated with a double-inverted circle in which the daily part matches the night part exactly in its inverted values and meanings. For instance, the biggest opposition between day and night is between noon (12.00 h) and midnight (24.00 h), meanwhile between 06.00 h and 18.00 h there is almost no difference in received illumination emission. On the whole, the maximal extreme ratio between the highest and lowest points of the received illumination emission in a daily cycle varies from 1:53 million at the polar zones to 1:216 million at the equatorial zone.

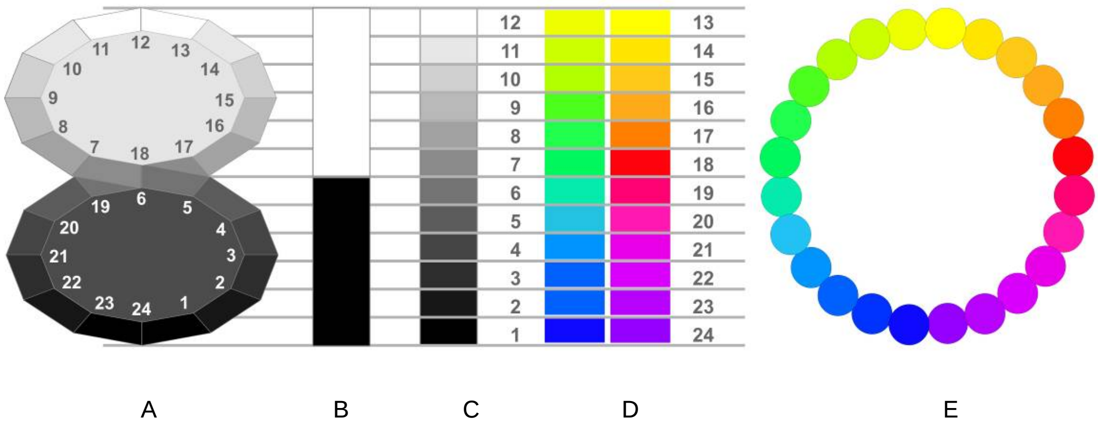

Figure 3: A daily cycle encompasses 24 h in time (A) and results in simplified version to white–black (B) or more advanced in a twelve level grey-scale (C), which splits by transition (D) to a 24-part chromatic colour circle (E).

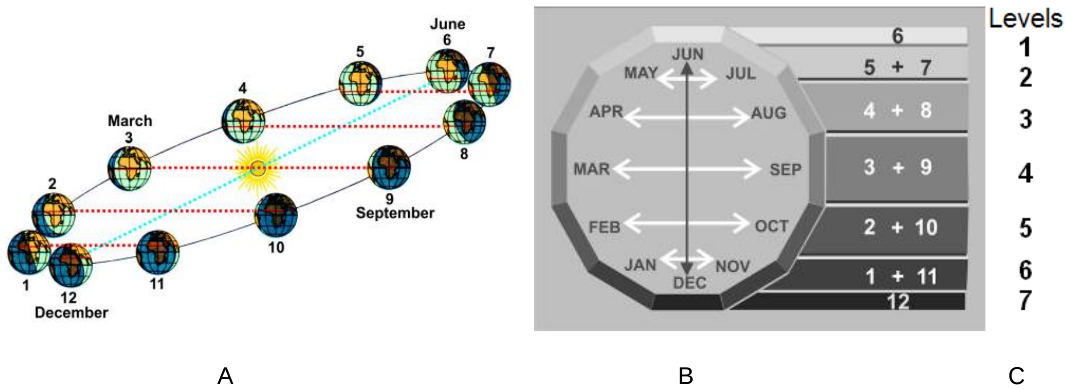

Figure 4: Annual cycle (A) is divided into five equal horizontal levels and one vertical opposition (B), together in seven level steps (C).

A certain level of achromatic scale corresponds with a certain lightness level on the chromatic scale, allowing the colours to appear in two different qualities: warm and cold. This unique characteristic of colours in connection with wavelength is the background for colour circles in which we may observe annual or daily cycles. In this way, the simplest white–black antagonism we may also interpret in colours as yellow–blue antagonism. In the more advanced twelve levels of grey-scale, we may split from twelve levels of achromatic grey-scale to twelve levels of chromatic colour circle. This is potentially the peak of possible natural colour diversification, which the human eye is able to differentiate naturally (see Figure 4).

Annual cycle

The annual cycle is one of the dominant cycles in human life. The Earth revolves around the Sun within a year and creates five symmetrically equal, horizontal levels and one antagonistic pair on the ecliptic rail. It means that the twelve months of the annual cycle are in symmetry regarding the received illumination emission. Finally, only seven different gradual steps remain, what is interpreted as seven levels of achromatic grey-scale, including white and black (Figure 4). A simplified division results in minimally two general oppositions, which are the basis for the 'Four Seasonal Model' [13].

In a more advanced interpretation, the distributed illumination symbolically correlates with the relative values of the seven achromatic scale steps, which is typical for each half-year period from one observation point of the globe (Figure 4) and, at the same time, it is just the opposite on the other side of the globe. As a whole, the maximal extreme ratio between highest and lowest point of the received illumination emission in the annual cycle is 1:7.

The simplified version of the annual cycle is divided into yellow–blue (Y–B), red–green (R–G) and white-black (W–K) relationships and is also the smallest possible version of a complete colour universe, as presented in a 'Mini Colour System' [14]. A more advanced model has been developed with transition from a seven level achromatic scale to twelve part chromatic colour circle. A certain level of achromatic scale corresponds with a certain lightness level on the chromatic scale, allowing the colours to appear in two different qualities: warm and cold [8,13,14]. This unique characteristic of colours in connection with wavelength is the background for the colour circles observed in Figure 5.

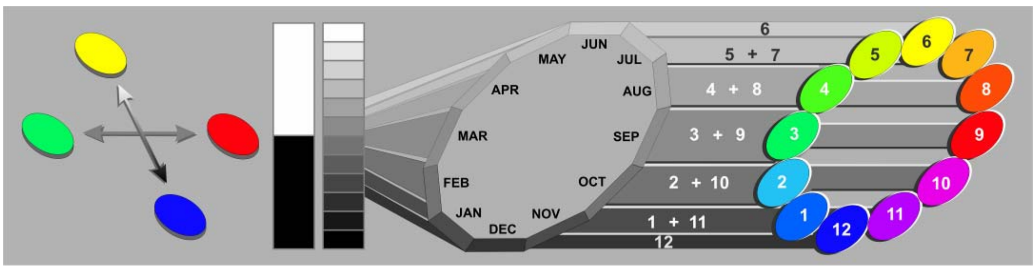

Figure 5: Interpretation of the Mini Colour System and optimal extended one, based on natural annual cycle.

Integration of daily and annual cycles

Between the daily cycle (DC) and the annual cycle (AC) there are certain similarities, but there are also differences in the detail, resulting in different palettes: DC based on twelve level grey-scale and 24 colour circle; and AC on seven level grey-scale and four and twelve colour circles. The DC extreme ratio is much higher towards AC's, which is around 1:7, which means that, in DC, the differences are much more exposed, obvious, dynamic and extreme than in AC, where the differences are hidden and spread over a longer period, so they are not always visible on first sight.

For instance, in equatorial regions day and night changes are quite extreme, but the seasonal changes are almost invisible in correlation with the temperate zone, where they manifest much more intensive and dramatically each season, especially if we compare summer–winter. In the polar zone, seasonal changes are again almost invisible, but it is also the same for daily changes, because it is half of the year 'day' and other half 'night', so changes are again almost invisible. In general, we may conclude, that DC and AC have certain common characteristics, especially at the symbolical level of meaning, which will be united later in the colour models.

Typology of colour circles

On the basis of daily and annual cycles, we conclude that colour circles rely on two different geometrical sequences depending on the relationship among colours. After consolidation, we obtained two main geometrical sequences of major- and minor-angled circle lines:

– the first major-angled circle consists of two pairs of opposing colours and one achromatic pair, with an equal angle of $\alpha = 90°$ in all directions.

– the first minor-angled circle consists of three pairs of opposing colours and one achromatic pair. The opposing colours correlate at an angle of $\alpha = 60°$ in the horizontal plane only, the relationship among the colour plane and achromatic pair axis is $\alpha = 90°$.

All further palette derivations and extensions rely on this principle differentiation of two basic geometrical sequences: major- and minor-angled circles. The differences are the biggest in their primary, basic form, each further step of derivation results in a split of the angles, which again reduces differences among the colours and, after a few steps, all the differences slowly disappear.

Major-angled colour circles

The major-angled circles rely on the geometrical sequences shown in Equation 1:

$$4 \times 2^0 \rightarrow 4 \times 2^1 \rightarrow 4 \times 2^2 \rightarrow 4 \times 2^3 \rightarrow 4 \times 2^{n-1} \quad (1)$$

resulting in a corresponding number of angle-parts in circles: 4-, 8-, 16-, 32-, 64-parts, etc. (Figure 6).

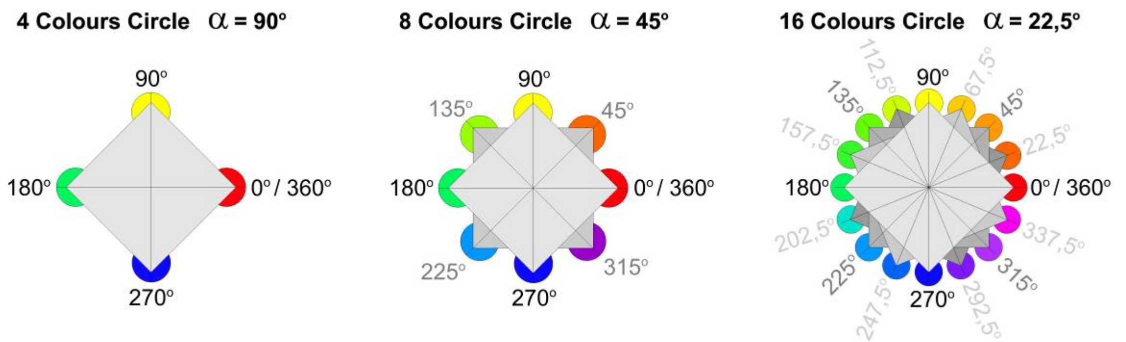

Figure 6: Sample of 4-part (A), 8-part (B) and 16-part geometrical sequences (C) of the major-angled circle line.

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The main characteristic of this sequence is that it begins with the smallest possible version of a complete colour system, as presented in the Mini Colour System which had been in principle, successfully exploited already in the 12th century, when colour science had not yet developed very far [15]. Logically, the colours were covered under the symbolic and metaphoric meaning of substituted forms of gold as yellow, silver as white, night as black or blood as red, for instance. This kind of ancient Heraldic example evidences the transmission of symbolical meanings to colour typology.

Generally, this circle line looks a little harder and robust, particularly at the beginning of the line. Each further step of angle split brings the circle a little more softness and smoothness.

Minor-angled colour circles

Minor-angled circles rely on the geometrical sequences shown in Equation 2:

$$6 \times 2^0 \rightarrow 6 \times 2^1 \rightarrow 6 \times 2^2 \rightarrow 6 \times 2^3 \rightarrow 6 \times 2^{n-1} \qquad (2)$$

resulting in a corresponding number of angle-parts in circles: 6-, 12-, 24-, 48-parts, etc. (Figure 7).

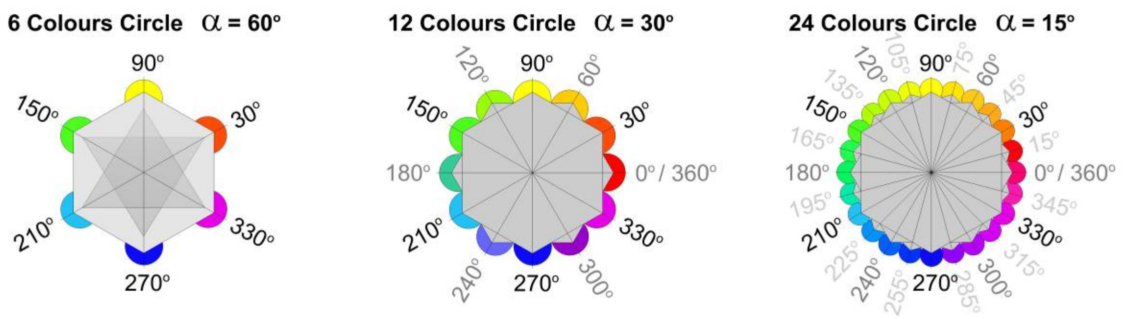

Figure 7: Sample of 6-part (A), 12-part (B) and 24-part geometrical sequences (C) of the minor-angled circle line.

The main characteristic of this sequence is that it begins with the optimal colour circle palette, which means a wider palette of primary colours, able to create more varied combinations, which are still unambiguously different on heterogeneous backgrounds. Basic appearance is softer and smoother than the major-angled colour circle line.

An important conclusion comes out of major- and minor-angled circle lines in comparison: each selection of opposing colours has different angles among the colours in the circles, which results in different types of opposing pairs (or triples, quadrilles, quintuplets, etc.), which then gives us different harmonious results. These results will be exposed only in a basic formation of colour palettes, attached with their ability for varied expansion.

Limitations in ability of the colour differentiation

Uncertainty in unambiguous colour differentiation grows by complexity and by the number of colours. Some colours on different background are no longer perceived as the same. A first level of major- and minor-angled colour circles performs as the smallest possible complete system, which are already able to create harmonious combinations. The shorter enlargement of both systems results in eight and twelve colour circles which represent the reasonable peak of natural logic for human's perceptive ability to differentiate colours unambiguously. A palette of eight or twelve colours in the colour circle gives a much wider spectrum of colour combinations, but unambiguous differentiation slowly vanishes with each added colour. Moreover, the psychological phenomenon of brain contrast enhancement and constantly-changing visual conditions additionally cuts down the number of possible colour differentiations.

Ontological colour models

Four seasonal colour model

This model is based on the four-colour circle. The structure of the model is based on psychological meanings in relationship to specific sequences in natural cycles, represented as a colour code of visual language.

It reflects and describes substantial meanings of particular sequences in certain periods (Figure 8). If we observe the substantial meaning of an early morning and compare it with an early spring period or an immature fruit or a very young kid, we cannot mistake them for late evening or late autumn, faded fruit or an old man, etc. Figure 9 presents correlations among colours, day time, months and seasons. In addition direct links exist in background for the whole psychological correlated apparatus of meanings.

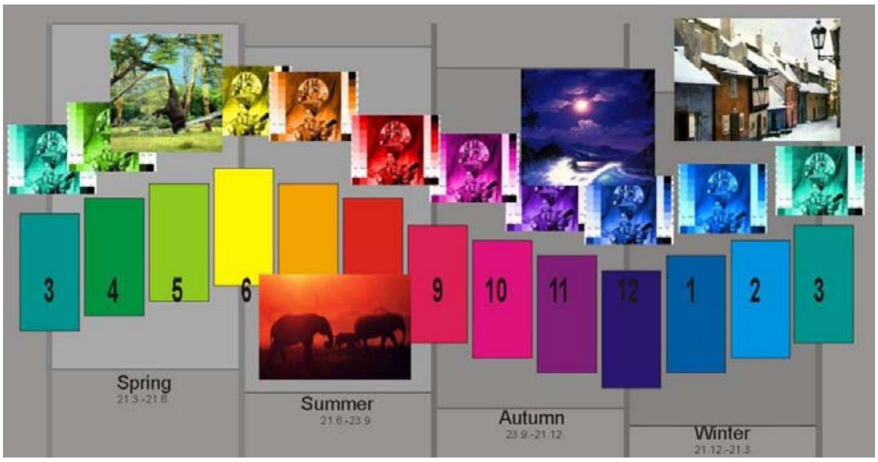

Figure 8: Four Seasonal Colour sine Model with all basic relationships among different time cycles, periods, lightness levels, colours and terms.

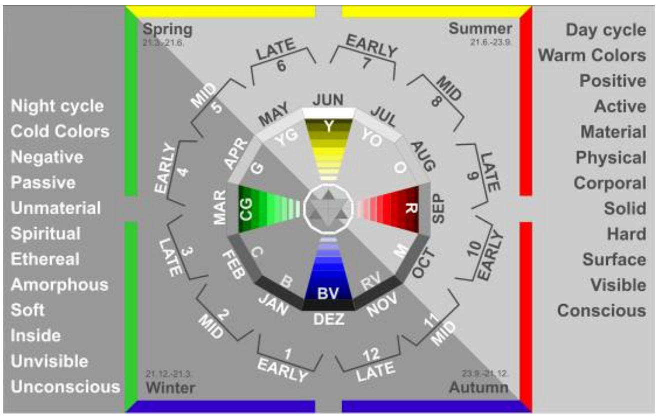

Figure 9: Version of Four Seasonal Colour Circle Model with all basic relationships among different time cycles, periods, lightness levels, colours and terms.

In such a way, colours assume this substantial meaning in the form of code. Of course, we have to define analogies more precisely, as to what would make such a model more plausible, but at this level we want to present only the simplest general idea, and what it is all about, otherwise the model may be complex and unclear.

The smallest ‘Four Seasonal Colour Model’ (4S-CM) (Figure 9) is presented as a base for the development of the more complex ‘Twelve Period Colour Model’ (see next section and Figure 10), which means the ideal peak of natural complexity and logic relating to human perception, based on an unconscious level as a common evaluating system, habits, beliefs, etc. Actually, both models are meant to be a three-dimensional model. They are interpreted in two-dimensional schemes only as wider preparation for application into the Periodic Colour Model, where it becomes of value in a proper and logic function, but there is a lack of space for including all these meaningful structures.

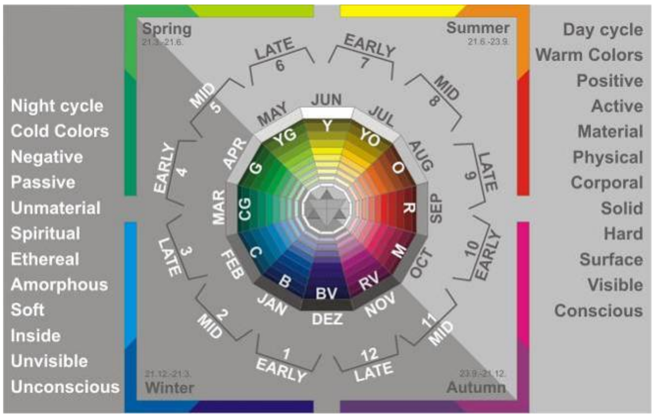

Figure 10: Version of Twelve Period Colour Circle Model with all basic relationships among different time cycles, periods, lightness levels, colours and terms.

Twelve period colour model

The ‘Twelve Period Colour Model’ (12P-CM) shown in Figure 10 presents reasonable peak complexity of the naturally completed colour circle with all its main attributes, which have been described already in 4S-CM.

In these two dimensional schemes, we may observe general correlations among the colours and meanings, relationship among cold and warm colours and it consequences, relationship among colours and months and seasonal periods. Actually, these schemes are only the starting point for explaining the meaning of colour dominance.

Periodic colour model

The Periodic Colour Model (PCM) presents a four dimensional geometric colour model relating to cycles over time. For example, we present as input the model 4S-CM, which rotates along the longitudinal axis from 0 to 360° (Figure 11).

The model itself is structured in order to classify linked meanings to colours in such a way that anyone can feel is natural and logical. Therefore, any type of PCM have to function, as simple or more complex, as a tool for analysis, prognosis, projecting or design, in a system of visual communication. It should function as a correlative linkage system, which translates terms from one field to another and finally, as a platform for grammatical systematisation of colour linguistics.

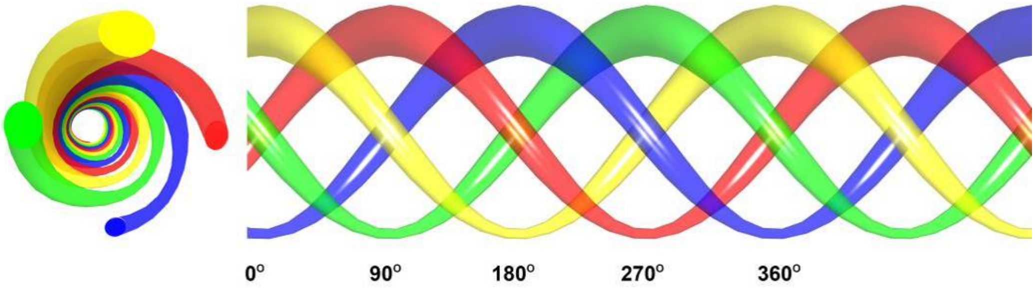

Figure 11: In the simplified scheme of Periodic Colour Model, a four-colour circle is input.

PCM formula

A simplified PCM formula used as an example is based on four-colour circle as input. The main goal here is to show periodical relationship of colours dominance in a circle as a result of different cross-sections of circle rotation. As the picture has to express the periodicity (either daily, annual or life cycle), the main (longitudinal) axis belongs to time and one period (day, year, life cycle, etc.) is given in 360° scale as shown in Figure 11.

The second and the third coordinate represent the time advanced in chosen colour dominance. In the four colour circle these are Y, R, B and G. The level of their dominance is represented not only in these coordinates but also as the area of cross sectional view: for each colour it is shown as a solid tube bounded by an elliptical surface with centres in a helix.

Hence, for each colour there are three variables changing as time passes, the first two (defined by a helix) describing the position of colour to the centre of the palette and a third giving an approximate level of dominance, expressed as the 'radius' of the cross-section of the tube. This last function d has to be chosen in accordance with the circle palette used.

For example, if we use $d(t) = 4 + 3\cos t$ (where t is time), we get the following model for the four colours Y, R, B and G equivalent to Equations 3–7.

$$t: 0,...,360 \quad (3)$$

$$Y: [\cos t, \sin t, d(t)] = (\cos t, \sin t, 4 + 3\cos t) \quad (4)$$

$$R: [\cos(t - 90°), \sin(t - 90°), d(t - 90°)] = (\sin t, -\cos t, 4 + 3\sin t) \quad (5)$$

$$B: [\cos(t - 180°), \sin(t - 180°), d(t - 180°)] = (-\cos t, -\sin t, 4 - 3\cos t) \quad (6)$$

$$G: [\cos(t - 270°), \sin(t - 270°), d(t - 270°)] = (-\sin t, \cos t, 4 - 3\sin t) \quad (7)$$

Sequences of dominant colours

In PCM, based on 4S-CM with its four-colour circle input we may observe, for example, changing sequences of colour dominance in four steps: at 0°/360°, 90°, 180° or 270°. The scheme of four colour PCM points out the sequences, where we can observe how dominant colours are ranked at different positions and how the values are distributed. Each colour cross-section consists of different colour patches of different sizes. According to the magnitude of the colour patches, we can rank them in this case in values 1:2:3, where value 1 is the smallest and 3 the largest (Figure 12):

– at 0° or 360°, yellow (Y) is in the dominant position, having the value of 3, green (G) and red (R) are in the first sub-position, having the value of 2. Blue (B) is in the inferior position, having the value of 1;

– at 90°, R is in the dominant position (value of 3), Y and B are on the first sub-position (value of 2) and G in the inferior position (value of 1);

– at 180°, B is in the dominant position (value of 3), R and G are on the first sub-position (value of 2) and Y in the inferior position (value of 1); and

– at 270°, it is G in the dominant position (value of 3), B and Y are on the first sub-position (value of 2) and R in the inferior position (value of 1).

Such a ranking principle is possible to use in any PCM, where with increasing number of colours the number of cross-section as well as of their complexities increases (Figure 13).

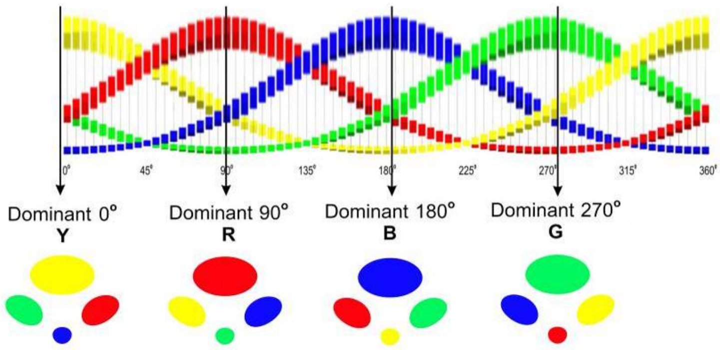

Figure 12: Periodic Colour Model consisting of four colours.

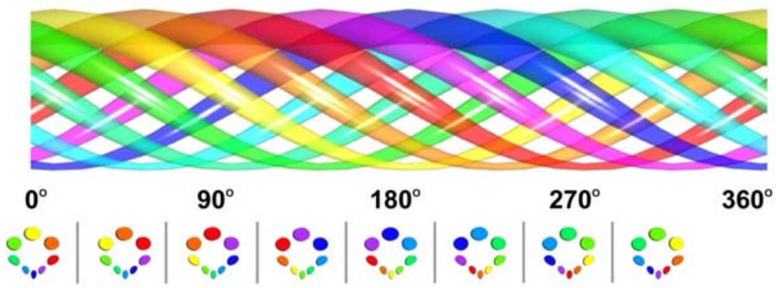

Figure 13: Periodic Colour Model consisting of eight colours.

A system of colour dominance

Colour dominance represents an evaluating system, based on relationship to natural cycles. For instance, if we observe a twelve period PCM in relationship to the annual cycle, each moment results in another cross-sectional circles value. It means that each cross-section has its own colour ranking and its own dominant colour value. Within the cycle periods the colour values are constantly changing. Regarding to the type of colour circle, we get different dominance gradations (Figure 14). A four-colour circle (CC) has three steps, 6-CC has four, 8-CC has five, 12-CC has seven, 16-CC has nine, 24-CC has thirteen steps, etc. The formula of dominant sequences is: $N/2 + 1$.

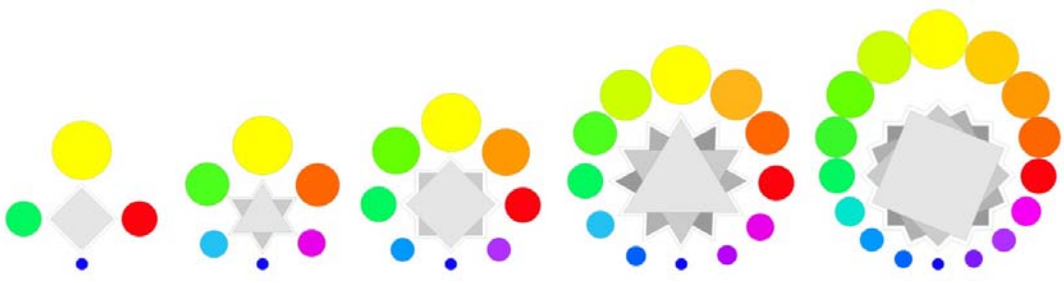

Figure 14: Different cross-sections of Periodic Colour Model with 4- (A), 6- (B), 8- (C), 12- (D) and 16-colour (E) circle.

Each sequence of PCM exposes a specific hierarchy of colour relationship which results from specific dominant colour towards other subordinated colours in that cross-section. It means that we have to deal with a type of colour ranking system. And if we accept the colours as part of natural correlated symbolic system, we are close to a complex analytical and prognostic tool, which reflects the majority of natural and social legitimacy at a symbolic level. A schematic overview of the first few PCMs are shown in Figure 15.

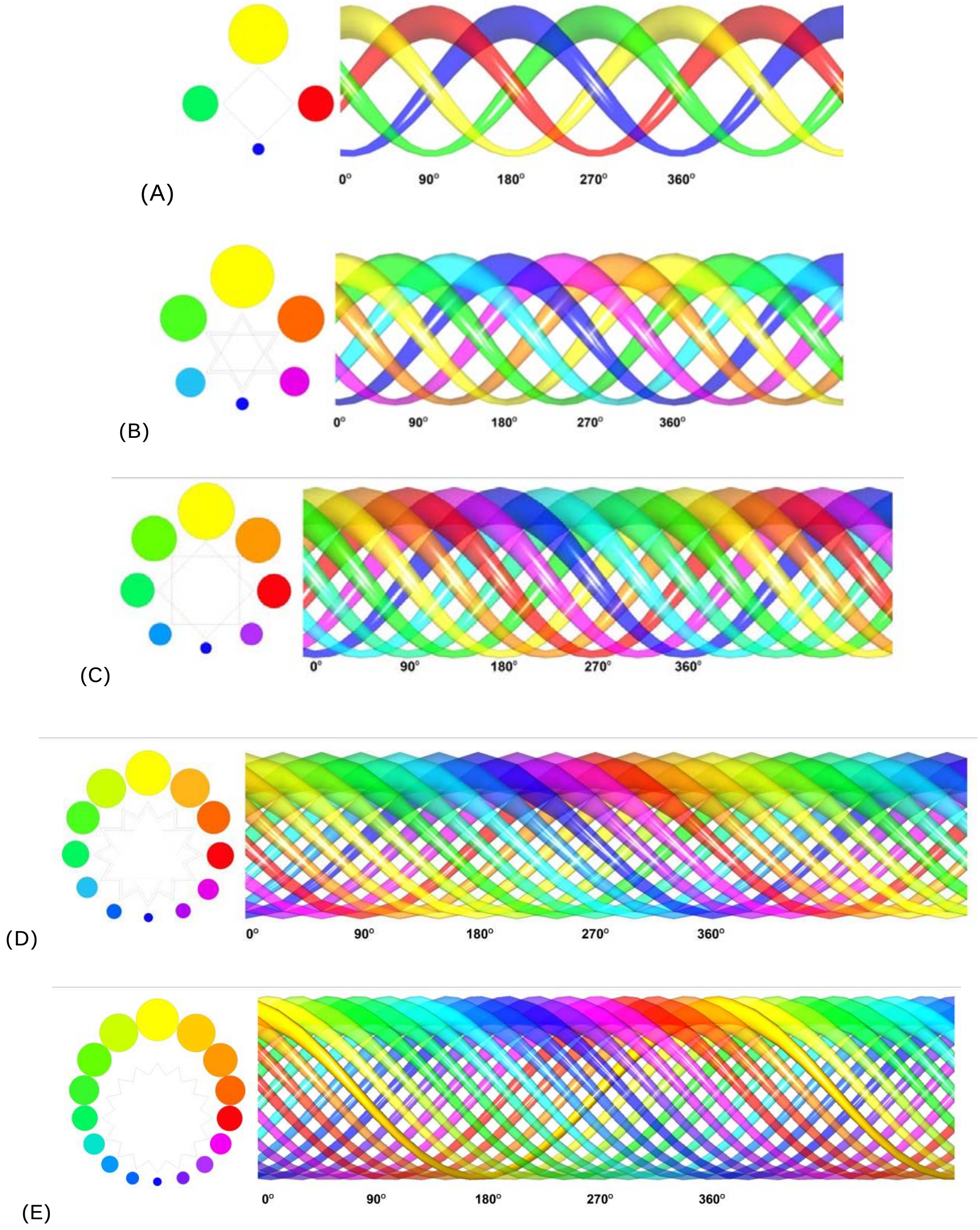

Figure 15: Schematic view of the 4- (A), 6- (B), 8- (C), 12- (D) and 16-colour (E) Periodic Colour Model.

Discussion

The relationship between natural cycles and colours is based upon the assumption that cycling events have an exactly defined structure and importance for each individual part. Man has got to know this gradually and incidentally over time, self-evidently understood, and used the knowledge and consideration throughout life. As examples: the feeling of chill during the night and in the morning, the feeling of brightness during the day, of heat at midday, of warmth in the evening, green fruit being unripe and red being ripe, etc. These interpretations gradually went over from the basic understanding of cyclic events to the field of colour symbolism. According to Berlin and Kay [16] the ancient Greeks were unaware of the individual colour green, but grass was synonymous for green. Later on, knowledge of the green object (grass) was transferred to the concept of green colour. This is observed even now, when the colour tones are named by the object [10,16-18]. Also in ancient times Heraldric colours were named by the objects. In this way, the night was synonymous with black, blood with red, gold with yellow (sun light), silver with white, sky or sea with blue, etc. The colour concept had dual, bisemantic interpretation. On the one hand, it symbolised the object's meaning and on the other hand the colour meaning, pointing already at that time to the unique, multilayered message of colours.

In humans, each visual stimulus is exclusively and entirely described and interpreted only by colours. Besides chromatic parts consisting of colours and colour tones, achromatic parts with black and white and grey tones also participate. Over the centuries, it became evident that writing dark letters on white ground is more effective for visual perception. Black and white with grey colour tones represents only the achromatic part of the colour space and the rest of the colours represent the chromatic part. If we write one word in blue and the other in red, we notice at once that the two words carry the semantic message and the message of colours' symbolisms, i.e. blue relating to cold and red to heat. The dual messages of colours can sometimes overlap, confirm or even deny and exclude semantic discrepancies between the messages for content and colour meaning.

This dual, bisemantic nature of colours is the key element in understanding the link between the meaning of cycles and colours and/or their symbolic meaning. In a broad sense, this area can be included in the subjective experiencing and explanation of colours, as well as all phenomena, involved with colour interpretation and colour systemisation. As each colour system aims to define the core of the amorphous colour space by its unique logic and philosophy into an organised, geometrically clear and simplified colour model, causing in a certain part abridge of the complete scope of the colour space. This subjectively influenced part of colour interpretation may tend to logic scientific explanation and, therefore, towards objectivity. However, it is under the complex influence of many scientific fields such as physics, chemistry, physiology, psychology and philosophy. Gradually, the subjective elements are turning to objective ones with the advent of new scientific knowledge.

Conclusions

The symmetry of 24 hour daily cycles results in twelve steps of achromatic grey-scale and the symmetry of 12 monthly annual cycles results in seven steps of achromatic grey-scale, always with white and black are included. The 24-part chromatic-colour circle is spelled from the daily cycle and 12-part chromatic-colour circle from the annual cycle. Both colour circle systems are basis for one of the main geometrical sequence: major- and minor-angled circle line.

Major-angled circle line is based on the angle division and the basic geometrical form of the inner relationships described as a square. Minor-angled circle line is based on the angle division and the basic geometrical form of the inner relationships described as a triangle. Major- and minor-angled circle lines result in different types of opposing pairs (or triples, quadrilles, quintuplets, etc.) which give us finally different harmonious results. However, by increasing the number of colours in circles the complexity and uncertainty in unambiguous colour differentiation grows. Therefore, the smallest colour circles, consisting of two, three or four colours in circle are most efficient in colour differentiation.

A palette of eight or twelve colours in a colour circle represents the reasonable peak of natural logic for human perceptive ability to differentiate colours unambiguously, giving wider spectrum of colour combinations. With each colour added unambiguous colour differentiation slowly vanishes. Therefore, the use of larger numbers of colours in colour circles is questionable.

In the frame of natural, everyday use a four-seasonal colour model is the most widespread. In contrast to the four-seasonal colour model the twelve-period colour model is more accurate but too complex to control manually. Computer programmes will be helpful tools to manage it properly in future and will also be the solution for the complex managing of Periodic colour models with their incorporated system of colour dominances. Proposed formula of the smallest PCM system is only the beginning. According to all appearances of different PCM's they need to be improved and developed further on in their potentials into the variety of pragmatic, analytical and even prognostic tools.

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