1.1. The Colour

Both in everyday practice and between specialists, much confusion arises from the use of the word "colour" for several concepts. In common usage, no distinction is made between the visible radiation penetrating the eyes, and the resulting imprint on our mind. Definitions in dictionaries usually refer only to the first concept, i.e.: "colour is the property of material phenomena perceptible by seeing, based on the reflection of light beams of different wavelengths". On the other hand, in accordance with the International Vocabulary of Illumination, the Hungarian Standard MSz 9620 makes a distinction

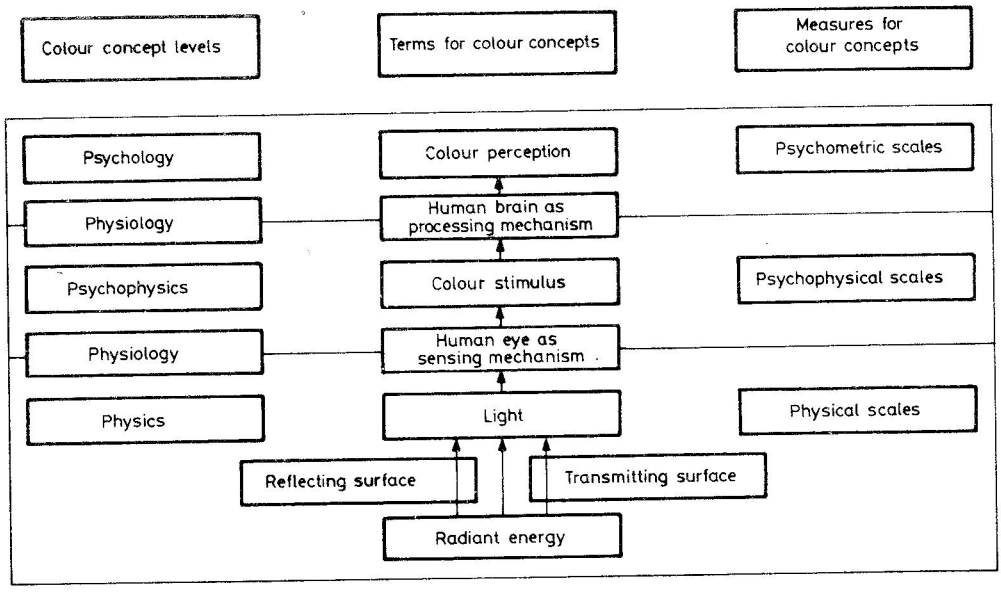

Fig. 1.1. The colour

between two concepts both named colour: "psychophysical colour" is called the characteristic of radiation penetrating the eye due to the differences of its spectral distribution, while "perceived colour" is the imprint elicited by this radiation in our consciousness. In the technical literature, radiation proper is called "colour stimulus", while the conscious concept elicited by it, is "colour perception"—but often, mainly if there is no risk to confound the two, simply the word *colour* (couleur, Farbe) is used.

Relations between concepts denoted by "colour" are illustrated in Fig. 1.1. The middle column of the figure indicates names for different colour concepts in publications, the left one the field of science concerned with colour in the given context, while the right one shows the nature of scales suitable to quantify the concept meant by the given term. Let us consider this figure beginning from the bottom.

First of all, colour defines a physical concept: radiant energy in the wavelength range of 400 to 700 nm. This energy may be described either directly, or as a narrow wave band reflected from, or transmitted by a surface. This light is, strictly speaking, coloured light. Use of the word "light" is only meaningful if our sensing mechanism the eye is involved.

A physically defined radiation penetrating the eye and eliciting colour sensation is the "colour stimulus", a psychophysical concept. It can be valued on psychophysical scales.

Colorimetry is concerned with the establishment of correlations between colour stimuli as well as their systematization and measuring. Colorimetry is a borderland between physics, physiology, and psychology. Colorimetry involves the concept of colour space based on additive colour mixing, developed on the basis of GRASSMANN's findings (1853). It is the basis of the International Colorimetric System (CIE* 1931). The

* CIE = Corporation Internationale d'Eclairage.

concept of a visually homogeneous colour space relies on theoretical and experimental findings for the ds element by JUDD (1968), as well as by WYSZECKI & STILES (1967). It has been applied for correcting the Munsell colour system relying on the idea of perceptional colour space. The corrected Munsell Renotation is considered as model for different UCS colour spaces.

The achievements of colorimetry have been exploited for the practical measurement of colour stimulus in a variety of industrial applications. The quantitative evaluation of colour stimulus (commonly called colorimetry) means in a strict sense the prediction whether two visual stimuli of different spectral distributions elicit the same colour sensation under given conditions or not. Measurement of colour stimulus offering a reproducible and exact determination of the colour of building material has entered architecture, and this initiated a cooperation between colorimetrists and architects. Along with this cooperation numerical expressions of colour compositions, mainly of colour harmony relationships became a necessity. To meet this demand, at first colour symbols describing relationships between colour stimuli seemed adequate but it has now become apparent that colour symbols suitable for colour space design have to meet requirements other than the measurement of colour stimuli. Colour symbol values have to express the three characteristics of colour space: hue, saturation and lightness, and aesthetically uniform variation of the colour space; one should be able to display colours by numerical symbols, the latter should be convertible to CIE *XYZ* coordinates.

Environment colours correspond to a wide variety of colour ranges in the colour space. Therefore environment colour design is expected to create harmony between colours of rather different hues, saturations and lightnesses. So it is much more important to have an aesthetical uniformity of the entire colour space than a reliable equality of just distinguishable colour differences. Endeavours with colorimetric studies resulted in psychophysical scales closely approximating the ability of the human eye to distinguish colours in different colour domains, but these scales are of limited usefulness when aesthetics are concerned.

Colour stimuli are transformed to colour sensations by our processing mechanism —the brain. The concept of colour sensation belongs to the domain of psychology and it can be evaluated by psychometric scales.

In everyday wording, words for colours such as red, green, ochre, brown, identify colour perceptions. When colour designers speak of cold or warm colours, they refer in fact to laws of colour composition, colour harmony relationships, or perhaps to colour adaptation or contrast phenomena; in other words they deal with correlations between colour sensations.

That element of the consciousness concept elicited by effects via our sensory organs —which cannot be analyzed further—is called sensation. The term colour perception, in turn denotes that kind of consciousness concept by which the observer is able to distinguish two adjacent parts of the visual field, having the same size, shape, and texture, and this difference can be attributed to the different spectral distribution of the observed radiations. Colour perceptions may vary in three respects, namely by hue, saturation and lightness. Geometrical representation of colour perceptions is simplest in a cylindrical coordinate system. Colours of the same hue lie in the semi-plane limited by the achromatic axis, colours of the same saturation compose coaxial cylindrical surfaces, while colours of the same lightness are in horizontal planes normal to the achromatic axis.

Different colour systems contain colours in the spatial arrangement mentioned above. The colour solid constructed in conformity with the system's principle is generally illustrated by means of a collection of colour samples. It is endeavoured to distribute colour samples inside the colour solid as evenly as possible. Namely a colour collection of any colour system is expected to help comparative colour determination making use of colour sample codes, and approximation by interpolation of the codes of colours missing from the collection is feasible only when colour samples are perceptionally equidistant from each other.

Colour systems belong to four groups according to their code system: systems are based on additive or subtractive colour mixing, as well as on printed screen, or colour sensation parameters. Practical experience has shown that it is the idea of using colour sensation parameters which meets demands of those concerned with colours in their creative work, such as architects the best. Therefore in recent years several attempts have been made to develop an ideal perceptional colour system.

For an architect concerned with environmental colour design, colour is a tool serving both technical and artistic goals. The distinction of colour sensations by unambiguous codes is required, in the first case, for defining technical parameters associated with various colour sensations, and in the second, by the need to express in a numerical way compositional relations between colour sensations. Beyond that, the colour designer, in addition to finding his way among colour sensations, has to be able to determine interrelations by estimation and measurement. The measuring system has to comprise directly or indirectly international units. Such a colour sensation measuring system based on the Coloroid system will be proposed later.

In the Coloroid system, the colour code is the representation of a colour sensation qualifying colour perception, but exactness of the code is determined by its relation to the colour stimulus eliciting the colour perception. In using the term "colour" it is often unclear whether colour perception or colour stimulus is meant. In everyday use, the colour "red" means a colour sensation but talking about its effects, red may indicate a stimulus i.e. a psychosomatic effect, but also perception meant as an associative effect. Adapted colour is a perception, but one that—rather than to be elicited purely by a correlate stimulus—is the result of a modification of the primary colour perception by the environment. Colour remembrance is also a content of consciousness but it is not elicited by a visual stimulus, and it is colour remembrance which generates the phenomenon of colour constancy. The term "preferred colour" is, in turn, a value judgement concerning colour sensation. Colour contrast is meant as a relation between colours, but in fact it reflects a relation between colour stimuli. Colour stimulus and colour sensation are inseparable, one being a consequence of the other; our laws of composition, aesthetic expectations for colour appearance, as well as their role in the built space can be interpreted only by their interrelations. This is why the two concepts of colour are not always distinguished in the technical literature, which often speaks simply of colour, although, an ever increasing number of scientific disciplines and professions join the research on colour relations. Artists, architects, psychologists, sociologists, aestheticians try to formulate relationships which in fact concern colour perceptions, but (to support their statements) they often refer to colour stimuli. Psychophysics, psychosomatics, and proxemics admittedly approximate the problem of relations between colour sensations on the basis of colour stimuli.

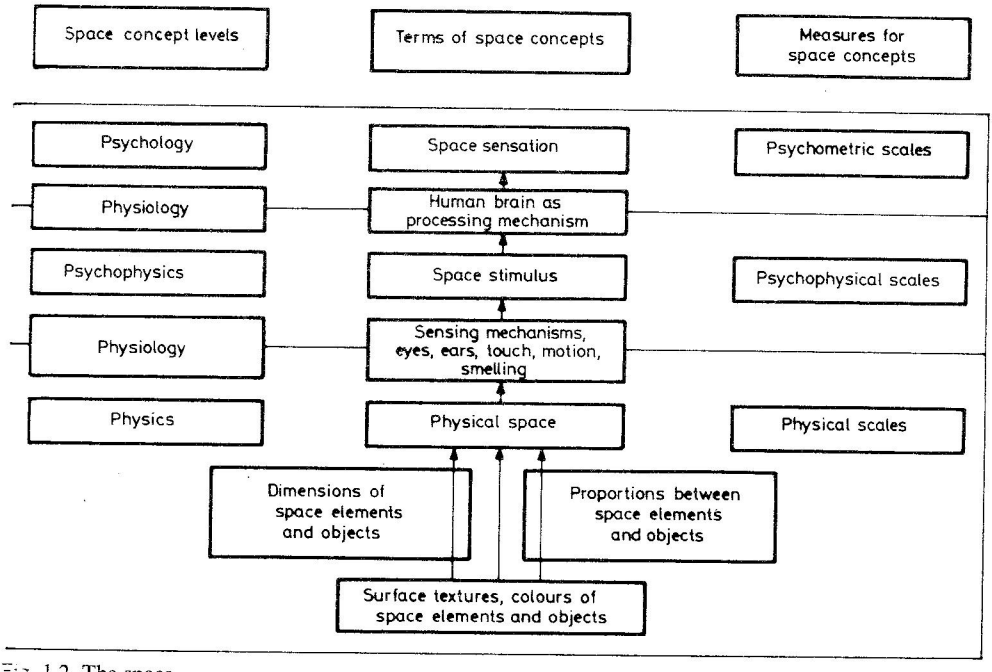

Fig. 1.2. The space

Since this book is primarily intended for those interested in a creative use of colours we usually mean colour perception, but for simplicity most often the term "colour" will be applied. But in every case when unambiguity requires it the exactly qualified terms are used.

1.2. The Built Space

The concept of built space is no less complex than the word "colour", which, as we have seen means both colour stimulus and colour sensation.

Space like colour has more than one meaning. Relations between concepts defined as space* are illustrated in Fig. 1.2. In the middle column are shown the names of different spatial concepts applied in the literature or suggested by the present author, in the left-side one the fields of science concerned with the given aspect of space, while in the right-side column are entered the scales used to quantify the given concept. In the following we discuss this figure from the bottom upwards.

The widely used definition of space—i.e. being the form of existence of matter characterized by three dimensions—refers to physical space. It involves dimensions, proportions and correlations between space elements, objects, but also texture and colour of space elements and objects.

* Omitting, of course, those of "cosmos" and of "time space".

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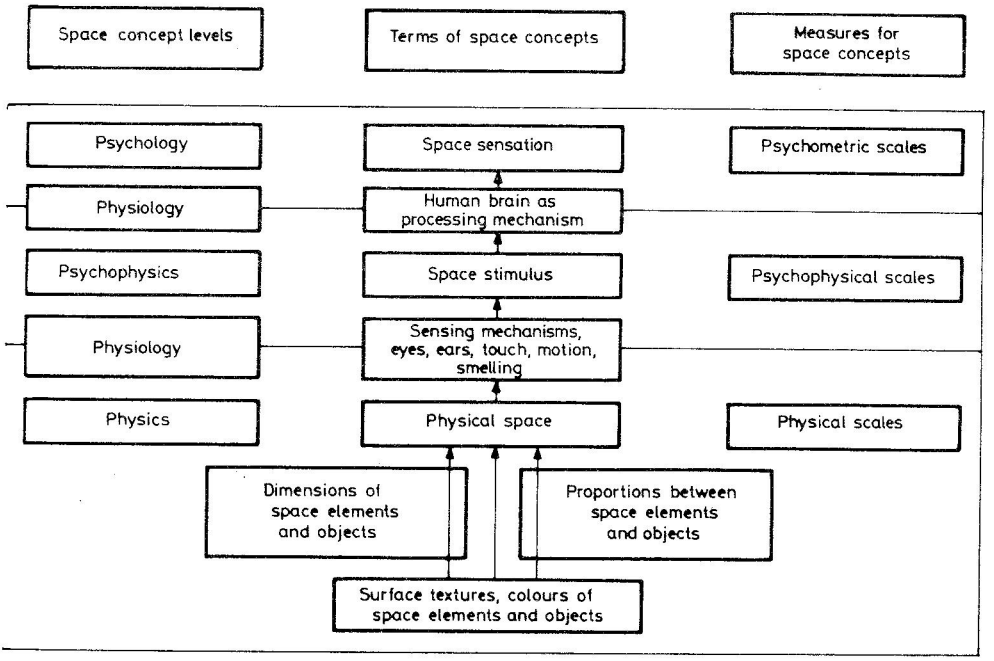

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Our sensing organs receive stimuli from the physical space. Their entirety is space stimulus, an essentially abstract concept pertaining to psychophysics. Space stimulus differs from physical space only by being centered on man. It contains up and down, front and back. A built space represented by a blueprint is a space stimulus, a term including dimensions, their correlations, and the topological order of the three dimensional elements of the given space. It expresses the existence in space but also to be a space, with all its spatial attributes. Space stimulus elicits space sensation, a consciousness content obtained by sensing the real space visually, auditively, tactilely, olfactorily, motionally, etc. Space stimulus is transformed to space sensation by our processing mechanism, the brain.

A concept other than space stimulus is meant by applying the word "space" in expressions such as compressed space, narrow space, monumental space, drifting space. Space sensation, the consciousness content elicited by a space stimulus depends on the relationship between its plastic elements as presented to us by the direction, intensity, quality of light, by surface texture and colour conditions. For man, space does not exist as a thing-in-itself (noumenon), but as effects elicited by these plastic elements. The statements good or bad space refer to space sensations. Space sensation belongs to the field of psychology and can be valued by psychometric scales. Judgements about a built space usually involve the concept of space sensation. In the field of theory of architecture, RIEGL (1927) was the first to attribute significance to the concept of built space by stating that Roman buildings manifest a space aspect quite different from that of Greek ones. He, of course, did not yet distinguish space sensation and the space stimulus eliciting it.

Modernists at the turn of the century, performers of the abstract "white revolution" (F. L. WRIGHT and VAN DER ROHE) who were especially and creatively interested in space laid great emphasis on demonstrating space, that is, they wanted to elicit a definite space sensation by a definite space stimulus; even they did not consider the two as separate entities. The slogan "white revolution" refers to an expulsion of colours from buildings, by painting everything white. Even GIEDION (1969), who recapitulated the space problem, did not differentiate between space stimulus and space sensation.

A more refined formulation of concepts related to built space arose only when disciplines earlier ignoring architecture, such as anthropology, psychology, sociology, became interested and started to study its relations from the aspect of space sensation. Of course, their statements often intermingle the two space concepts, such as in the definition by HALL (1963) for the two proxemic varieties of built space, where the terms "sociopetal" and "sociofugal" were applied, defining thereby different space sensations, although the terms were deduced from space stimulus. It can be seen that in the use of the space concept, similar ambiguity to that with colour prevails.

Starting from the function of space, KAHN (1953) investigated the relation between space sensation and function. According to him the function of space is decisive for space sensation. This idea leads to theoretical problems about the relation of space creation and artistic activity. The same emerged in the works of VENTURI (1966) who was concerned with the function of content and form in architectural space sensation, and also by KEPES (1965) who discussed the scope of our visual information on space. Let me take their arguments one step further by stating that the surface appearance and colour of an environmental element contributes to the expression of the form, while its function contributes to the expression of the content of built space.

In our days, built space is being also studied by gestalt psychology, applying the same terminology in investigating the conditions of space sensation as that applied for the conditions of colour perception. Their language differs, however, from that used by architects, this in turn from that of painters, colorimetrists or colour designers. This is why here, when using the concept of both built space and colour, we wish to make a distinction between stimulus and sensation, the consciousness content elicited by it.

1.3. The Function of Colour in Space Experience

Man living in a built environment, the user of a built space, is protected from the tribulations of nature, he utilizes the services of his surroundings and enjoys comfort from these services. In addition to its actual measurable properties required for the physical and biological existence of man, built environment has other qualities, too.

Built space acts upon man in several ways: by the proportions, the relationship and shape of its elements, the order of forms, by surface appearance, and colours of the elements, by the relation between space proportions, by the expression of function, by the relation between the expressivity of function and the function proper, and by the shape and colour associations expressing function. This effect materializes as an emotional experience of the actual space, and space sensation. Space sensation is an experience about a given space, an accomplishment of one's own personality. The function of colour in this experience has not yet been considered by the theory of architecture, let alone a formulation of the relation of built space to colour. This book intends to fill this gap at least in part.

The content of space sensation may be deduced from two components, such as space perception itself, and its relation to the function of the real space. Space perception is a content of consciousness generated by space stimuli representing the connection of being part of a three-dimensional space and observing it from the outside (spatiality). So, primarily the role of colour in space perception will be examined. As the purport of space perception is determined to a certain degree also by the function of the real space, and the expression of this function is assisted by colour, also this feature of the colour will be considered.

1.3.1. The Function of Colour in Space Perception

Space perception is a complex process to which several sensory organs contribute. Among them, visual and auditive stimuli and those arising from motion in space are the most important. All these add up to a space stimulus eliciting our space perception.

Space stimulus is elicited by measurable and tangible real space, composed of space elements as well as of correlations between shapes and surface appearances all describable by physical magnitudes. We obtain most of our information about the objective correlations, shapes and surface appearances of space elements by reflection, absorption or transmission of light by the surface of the element delivers visual stimuli to us from the space.

Assuming that the surface appearance of space elements is of the same finish, texture, and colour, and that the elements are illuminated from the same direction, with the same

intensity and spectral distribution, then due to visual and motional parallaxes, overlapping, line and air perspective, light–shadow effects, a space perception with a linearity directly proportional to that of the change of the real space is elicited.

Colour identity as a condition means that light incident from the surfaces into our eyes has the same wavelength; that is, colour sensation is the same throughout, and also, that for the same angle of incidence, the ratio of the quantity of light incident on, and reflected by surfaces is the same everywhere, and in the reflected light incident on the eyes, the ratio of complementary radiations, hence, saturation, is felt to be the same throughout.

To examine the function of colour, let us assume that stimuli arriving into our eyes come from the elements of such an objective space where dimensions, proportions and relations of the elements do not permit overlapping and the interpretation of line perspective relations; further the onlooker does not move in space, missing the help from laws of motion parallax in space perception. If these conditions are met, and in addition direction, intensity and spectral energy distribution of light within the space are constant and the former restriction of equal hues, saturations and lightnesses of surface colours holds, the objective space can be judged only by evaluating the perceived colour sensation differences.

Intensity differences of the stimuli emitted by space element surfaces and reaching our eyes permit us first of all, to decide on the spatial position of the light source, then from hue, saturation and lightness differences of space element surfaces, on the distance of space elements from the onlooker, hence on the space itself.

It is known by experience that the more remote an object, the more hue component of the colour sensation generated by its surface is shifted to hues of shorter wavelengths, its saturation toward achromatic colours, and that its lightness component varies as a function of the two other components and of the position of light source. This experience helps our space sensation although its significance can really be perceived only if the former condition of colour identity is abandoned. In reality, this is always the case. With space elements painted different colours, it cannot be decided anymore, which element is the closer and which is the farther away. Orange and red, even if in reality more distant, are felt to be nearer than blue or green. Saturated colours are felt to be nearer than are unsaturated ones. Very dark surfaces emit very little or no stimuli to the eye, so that these are not sensed, rendering space perception impossible.

1.3.2. The Role of Colour in Expressing the Function of Space

Colour contributes to space sensation also by expressing the function of space. Function of the built environment is a demand raised to social level. Structural relations in a system composed of man and the elements of his environment are defined by a complex function having three components: utility function, aesthetic function and informative function. Let us see now how colour—colour stimulus and colour perception—contributes to the realization or expression of these functions.

Environment is the scene of human activies, serving human demands. Much of these demands refer to the utility function of environment. Built environment is required to protect from the rigours of weather, to endure dynamic forces generated by our machin-

ery, to protect from such factors as excessive temperature fluctuations, intense noise, and other factors from working processes detrimental to health. A recent requirement is feeling of comfort in one's milieu so as to stimulate the development of our mental and physical abilities.

Colour has a significant function in meeting these demands. Due to its psychophysical and psychosomatic effects, it may raise our blood pressure, or change the composition of blood and gastric juices. Colour can make one feel healthy or ill. A person in an environment of preferred colours feels better, his/her ambition to work increases. Some colours favour concentration, others cause deconcentration.

Just as anything else, built space and all its elements are separable unities of content and form. Environment fulfills its aesthetic function if it expresses its utility function in conformity with the unity of content and form, where the utility function is the content, while form is expressed by shape and colour of environmental elements. Since the content of objects in our environment, let alone, in our built environment, is its function, the built space and objects within, its content can only be grasped, and fully expressed by means of their proper functioning, and operation. Practical and spiritual components of the function are interdependent. Even the remark may be risked that aesthetic design of an object or built space is impossible when ignoring its functions. As a conclusion, there are no aesthetic prescriptions of general validity.

In designing colour relations for a built environment as a human creation, it is also a question of what importance is attributed to practical functions of the environment for human life in general. Every work and activity is linked to emotions, thoughts and ideas, therefore every object, tool or built space demands its share of these mental, emotional, ideological threads, in conformity with its role, significance and function in one's life. Colours of the built space as elements of form in the couple content and form, are made necessary by the sensation of function, giving rise to a harmony sensation of the indissoluble unity between content and form in our consciousness. Of course, the sight of some colour complex may cause aesthetic pleasure, but detached from the content of space i.e. from its function, this pleasure lacks the effect of complete space experience.

Those who wish to express the message of built space have to know about relations between environmental structures, i.e. about the so-called compositional relationships in order to be able to create proper relations between forms—and within that—of colour perceptions. These relations comprise those between colour perceptions, i.e., colour harmonies. Thus, the design of space sensation also exploits colour harmonies in this space.

Informative functions of space are features which interpret the functions of the environment and its elements and explain how to use and operate these elements. A significant part of the informative functions of the environment are borne by chromatic information. According to their message, chromatic information may be interpreted either as logic, or as aesthetic information. Both kinds of information are borne by the same elements but every form of message has its own structure. Their characteristics are determined partly by differences in their visual system, complexity and structure, and partly as psychic differences between their communication content. Information content is transmitted by highlighting, contracting and grouping some visual symbol elements in the informative surface or space, while omitting others. A colour group draws our attention when it is clear-cut and its structure is easily intelligible.

Chromatic information of a logic nature i.e. the various standardized color codes are practical tools which appeal to our logical mind. They transmit messages and serve also to influence observers in their decisions and control their attitudes and behaviour.

Aesthetic chromatic information is primarily emotional expression of inner conditions, and is expected to have mental and emotional effects by commonly accepted semantics. By their operative and recording functions visual codes are not only bearers of the meaning of the content of built space and its social concept, but also expressions of the approach and culture typical of the creative subject. Chromatic in built space information necessarily and conveniently takes the form of colour harmony relations. This is why it is of prime importance to examine colour harmony relations.

1.4. Development of the Concept of Colour Dynamics. Aim and Message of Colour Dynamics as a Science

Colours of space elements dynamically affect man staying within a built environment. Consideration of these effects, and examination of their components is the essence of colour dynamics. The term "colour dynamics" emerged in the '40s. Its generalization may be attributed to three authors: FRIELING (1968), BIRREN (1961) and DÉRIBÉRÉ (1968) who started to apply it independently but almost simultaneously. For all three of them, colour dynamics implied primarily the colouring of the workplace environment taking various psychophysical and psychosomatic effects of colour on man into consideration, such as the effects on tiring, mental and bodily concentration, ability and performance. Therefore as is common knowledge, colour dynamics has been associated with ergonomics which developed during the same period. This public attitude still persists. In fact, however, none of the above mentioned authors considered colour dynamics as part of ergonomics. In their essays they stressed the space forming effect of colour, studied the aesthetic relations of colour to built space, involving a wide range of space functions rather than workplace surroundings alone.

Their work—just as the introduction of the term "colour dynamics"—relied on the proliferation of results of psychophysical and psychosomatic studies starting in the '20s and '30s. Here we may mention authors such as KOFFKA and HARROWER (1931) who recognized that shaping properties depended on coldness or warmness of colours, or COOK (1933) who was concerned with colour adaptation, or ESHER and DESRIVIÈRES (1964) having observed the different stimulating effects of radiations of different colours on living organisms. Relations of built space, colour and man have already been pointed out by early studies on colour preference and colour association. LUCKIESH (1916) investigated, among others, the variation of colour preference in daylight and in artificial illumination. On the other hand, KARWOSKI (1929) looked at the relations between colour and sound.

Independently or as a reaction to the "white revolution", architectural creativity at the beginning of this century was also examining the possibility and right of colour to reappear in built space. At the beginning of his career, LE CORBUSIER (1960) committed himself to the space forming role of colour. An outstanding fact in this respect was his taking stand together with LÉGER at the 1933 CIAM Congress in Greece. About this LÉGER wrote in his mémoires (1954): "The pure tones, blues, reds, yellows escaped from my pictures to reappear in posters, in shopwindows, at roadsides and on road signs.

Colour became liberated to become a reality on its own. It has obtained a new impulse, and its effect became independent of the objects including or bearing it before". It was at that time, that a new avantgarde school of architecture grew interested in colour thus set free. Again, LÉGER put it, in connection with LE CORBUSIER's 1925 "New Spirit" pavilion: "Of course, the reception was other than unambiguous, the decisive step has nevertheless been taken, its consequences will soon appear". And: "How to create the sensation of space, how to disrupt barriers? Simply by colour, by walls of different colours! A dwelling which I may call a habitable rectangle, will transform to a flexible rectangle. Light blue walls recede, black walls advance, yellow walls disappear. The new possibilities are enormously wide...".

The importance of colour in the shaping of space has already been recognized by Bauhaus where a number of the most eminent painters of that age, such as KLEE (1925), ALBERS (1963), KANDINSKY (1914), ITTEN (1961) acted as professors.

After World War II, the two schools of thought working on the elaboration of colour to built space relations gradually converged in a process marked by publications by GÖRSDORF (1953c), GLOAG (1957), FASANI (1960), FRIELING (1960), BANHAM (1962), HARDY (1967), DÉRIBÉRÉ (1968), BIRREN (1969), PORTER (1976), SPILLMAN (1977), GERICKE (1981), DARMSTADT (1984), PRÖLSS (1984), BRINO (1985b) and NEMCSICS (1985a). The present author's activity also contributed to the development of a unified approach to colour dynamics. It is no coincidence that the International Conferences on Colour Dynamics organized in 1976, 1982, and 1988 in Budapest were attended by representatives of both trends. By the '80s, international events concerned with environment colour design became frequent. Amongst others international colour design competitions were launched in Stuttgart.

Nowadays we regard colour dynamics as a dual activity. One side is the disclosure of man-to-colour of complex man-to-coloured environment relations, and the elaboration of methodologies for the design of coloured environment. The other side is the utilization of these findings in environment design practice. These activities involve the collection and systematization of knowledge on relations of man, colour and built space offered by different disciplines as well as to devise and realize research to fill the gaps. This activity has taken momentum worldwide whereby the science of colour dynamics came into being.

Colour dynamics as a new science is concerned with the relations between the surface appearance of environment and environmental elements, and man living in this environment. It studies the interrelations of colour, man and environment. Thus, colour dynamics as a science is a complex of theoretical and practical activities directed towards the disclosure of objective relations between man and coloured environment, as well as towards a conscious environment colour design.

Rather than to be a collection of everyday experience, colour dynamics is a science. Although it investigates and processes the spontaneous, intuitive transformation of the environment by individuals, it handles its information by scientific methods, applying scientific methods in environment colour design. It has been proven both theoretically and practically that it is possible to conduct these activities by exact, scientific methods.

Environment design—including any architectural activity—has increasingly access to results of this new science. Its practical application helps our built environment to cope better with its function, to be more beautiful and more sophisticated. It helps us to

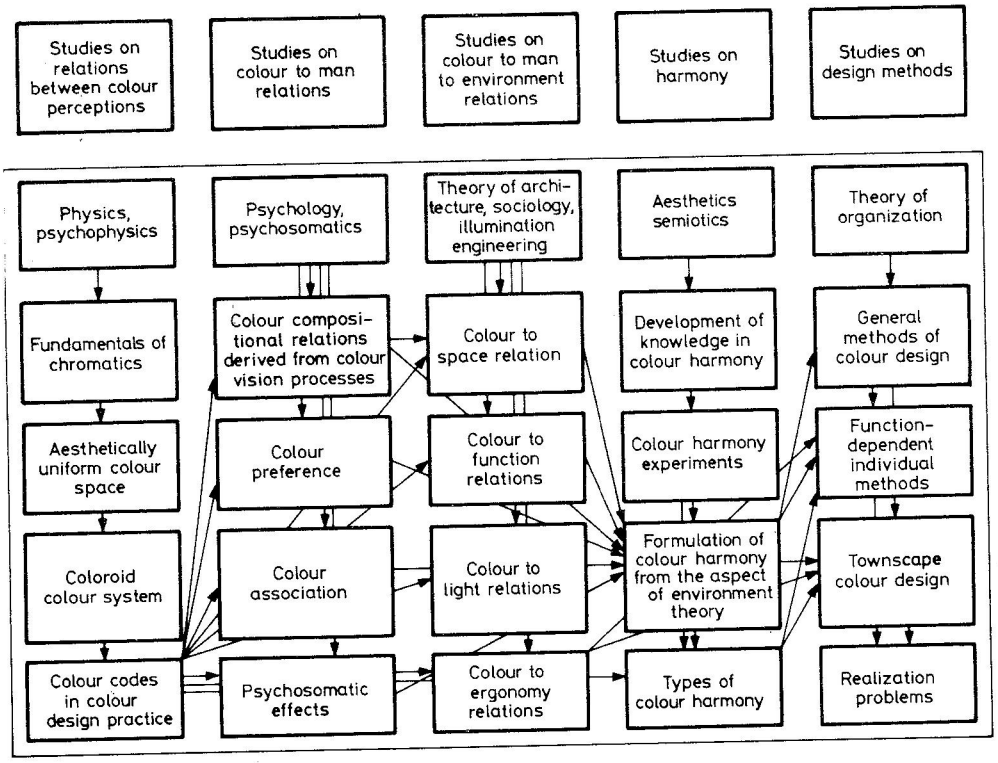

Fig. 1.3. The content of the science of colour dynamics

expand mental and bodily abilities, to compensate for harmful effects of our overwhelming industrialized environment, to develop an adequate space perception and to understand spatial relations and correlations between spatial processes. Conscious application of colours is expected to direct and orient man between multiplying and often depressive environmental hazards.

The science of colour dynamics has five different but inseparable branches (Fig. 1.3), the achievements of each are interdependent. Knowledge and relations amassed by other sciences are collected and purposefully systematized, and its special research problems are based on this foundation.

The fundamental problem of colour dynamics is to find relations between colour sensations, to develop an aesthetically uniform colour space and a colour system fairly approximating to it, further to introduce a new system of colour coding suitable for practical colour design.

The second group of problems is concerned with man to colour relation independent of the environment. This involves colour composition problems in connection with the processes of colour vision. Such problems are e.g. stimulus thresholds and difference thresholds, colour adaptation, colour constancy, colour contrast, colour preference, colour association, and the psychosomatic effects of colour.

The third group of problems includes the complex relation between colour, man and built space, including problems of colour and space, colour and mass, colour and form,

colour and texture, colour and function, colour and illumination, of offsetting harmful environmental effects by colour, and finally of the social functions of colour.

The fourth group of problems is related to colour harmony research, the establishment of colour composition relationships for use in practical colour design: the determination of levels and parts of the concept of colour harmony, and of the fundamental and accessory conditions of eliciting colour harmony sensations.

The last, fifth group of problems is the development of the most effective methods of colour design, the best way of incorporating the finding of colour dynamics into practice. Statements are made exploiting practical observations obtained from realized colour designs.

This book is concerned with the achievements in all the mentioned domains of colour dynamics as a science, and their practical applications.