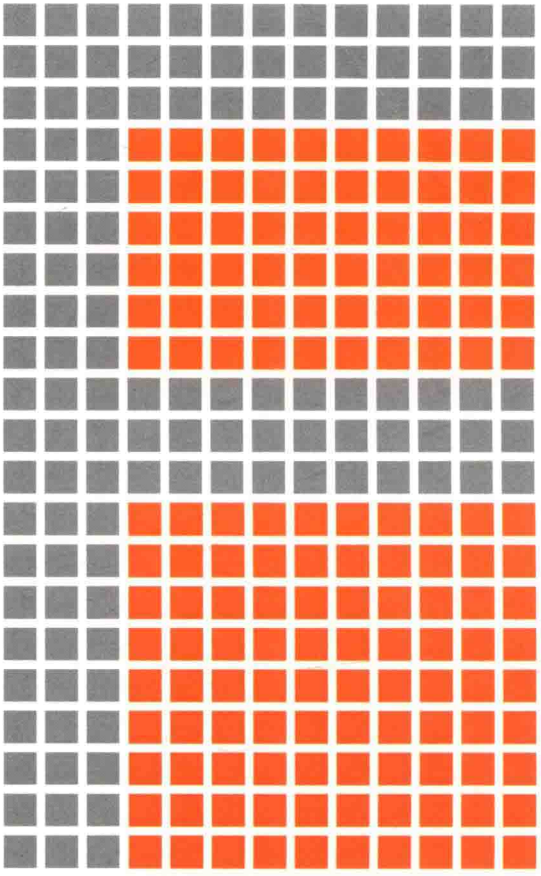
FORM AND COLOR



高等院校工业设计专业“世纪风”精品教材

造型基础　形式与色彩

应放天／杨　颖　著

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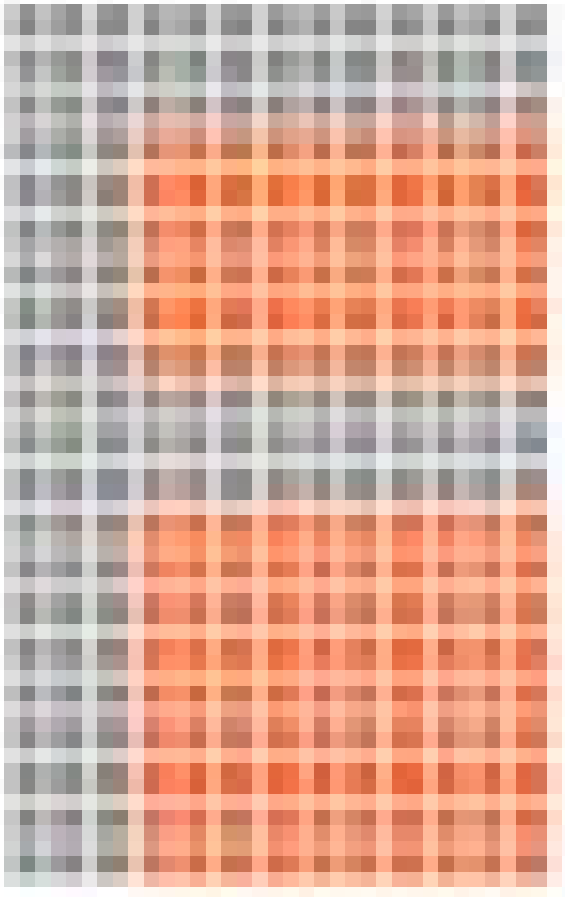

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图书在版编目(CIP)数据

造型基础——形式与色彩/应放天　杨　颖　著. —武汉:华中科技大学出版社,2007年8月
ISBN 978-7-5609-4030-4

Ⅰ.造…　Ⅱ.①应…　②杨…　Ⅲ.造型设计　Ⅳ.J06

中国版本图书馆CIP数据核字(2007)第058308号

造型基础——形式与色彩　　应放天　杨　颖　著

责任编辑:杨志锋　徐晓琦　　封面设计:潘　群
责任校对:周　娟　　责任监印:张正林

出版发行:华中科技大学出版社(中国·武汉)
武昌喻家山　邮编:430074　电话:(027)87557437

录　　排:龙文排版工作室
印　　刷:湖北新华印务有限公司

开本:880mm×1230mm　1/16　　印张:6.75　　字数:170 000
版次:2007年8月第1版　　印次:2007年8月第1次印刷　　定价:39.00元
ISBN 978-7-5609-4030-4/J·57

内容提要

形式与色彩是设计的基础和重要组成部分，学好形式与色彩的应用，对正确把握用户心理及提高设计能力有着举足轻重的作用。本书采用英汉对照的形式，从全新的视角，以大量生动的案例重点介绍了形式与色彩的提取、采集方法及其在各个领域的应用，图文并茂，可读性强。

本书适合各类大学设计类专业的师生作为教材使用，也可作为设计师的参考用书。

高等院校工业设计专业“世纪风”精品教材

编 委 会

序 言

应放天，男，1970 年生，浙江大学计算机学院工业设计系副主任，副教授，1994 年毕业于无锡轻工业学院工业设计系。曾经在国内外核心刊物上发表过学术论文 10 余篇，出版设计类书籍三种，主持国家科技部 863 项目 1 项，省部级项目 2 项，与规模以上企业科研合作项目百余项。目前研究方向为信息产品整合设计、设计语境。

杨颖，女，浙江大学计算机学院工业设计系讲师，长期从事产品设计与交互设计研究，先后参与了国家自然科学基金、"国家 863 计划"等重大科研项目，并主持了若干项重大设计项目。主要研究方向为产品语意设计、产品品牌识别与设计策略、产品交互设计、设计信息可视化等，发表论文十多篇。

设计是一门集艺术、技术、人文、社科等学科于一体的交叉学科，涉及方方面面的知识。形式与色彩是设计的一个重要组成部分，直接影响着作品的感官效果。形式与色彩是设计的基础，学好形式与色彩的应用，对正确把握用户心理及提高设计能力有着举足轻重的作用。

本书采用英汉对照的形式，从全新的视角，以大量丰富生动的案例重点介绍了形式与色彩的提取、采集方法及其在各个领域的应用。本书适合各类大学设计类专业的师生作为教材使用，也可以作为设计师的参考用书，为广大设计爱好者提供了丰富的素材。

本书共有五个部分：第 1 章，形式与色彩的基本要素，分别介绍了构成形式与色彩的各要素的概念；第 2 章，形式与色彩的要素及应用，介绍了形式与色彩的基本要素在设计中的应用；第 3 章，形式的色彩表情，重点介绍了形式与色彩的各种提取方法及其提取后如何在设计中具体应用；第 4 章，形式与色彩的构成，介绍了形式与色彩的相互关系、常用的构成方法及其应用；第 5 章，形式与色彩的应用，以大量丰富的案例介绍了形式与色彩在各个领域的应用。

鉴于作者能力所限，书中不当之处在所难免，希望各位同行指正！

本书中所涉及的案例，主要为浙江大学工业设计专业的学生作品，在此向所有为本书提供案例的同学表示衷心的感谢！

著 者

2007 年 3 月于求是园

目 录

第1章

Elementary Factors of Form and Color

形式与色彩的基本要素

构成形式的基本要素主要有：点、线、面、体、色、光、质。

The elementary factors of form are point, line, surface, object, color, light and texture.

1.1 点 Point

对点的理解可以分为绝对的点和相对的点。

绝对的点是线的标记位置，主要表征位置信息，如线段的起点、终点、线段的1/3处；是线与线的交点；是线与面的交点。点是一个数值的概念，不具有大小，没有形状，只具有位置。可以通过点的位置、点的分布来表示一定的信息。

设计中的点，是相对的点、感性的点，不仅具有位置，还具有形状、面积、颜色等（见图1-1）。点如果没有形，便无法作为视觉表现。当某一形状相对于另一形状而言，面积相对较小时，该形状便可被看作是点。如手机的某一按钮，当其作为功能的按钮时，是一个独立的、完整的形体；当其相对于整个手机时，便可以被看作是一个点，整个手机的按钮连在一起，便成为一个点阵。

图1-1
各种形式的点

The understanding of point can be divided into absolute point and relative point.

Absolute point is the marking position of a line, representing information on position such as the beginning point, ending point or one third point of a line. It is a junction between one line and another line, or a junction between a line and a surface. Point is a concept of figure with referring to only position rather than

size and shape, and the position and distribution of point can convey some certain information.

Point in design is relative and perceptual, not only owning position but also shape, area and color (figure 1-1). If point has no shape, it isn't visible. When one shape is smaller compared with another, it can be seen as a point. Take a button of a cell phone's keyboard for example. It is an individual and intact object when treated as a functional button while a point as far as the whole cell phone is concerned, and if all buttons on the cell phone are connected, a point array emerges.

1.2

线

Line

对线的理解可以分为几何学中的线和设计中的线。

几何学中的线是点的连续运动形成的轨迹，是极薄的面互相接触时形成的接触线。平面相交形成直线，曲面相交则形成曲线，空间曲面相交形成空间线。线是没有粗细之分，而只有长度、方向与形状之分的。

设计中的线，是相对的线，具有形状、体积、轮廓、色彩等。当一面积相对于另一面积的比例较小时，该面有时可以被看作线。如某机箱上的光驱，当其作为独立的光驱时，是一个完整的、具有细节的面，但是在与整个机箱的面积相比时，便可以被看作一条线。

如果把点的形状称之为点形，线的形状称之为线形，二维展开的面的形状称之为面形的话，则线形又可分为直线与曲线，后者又分为开放的曲线及封闭的曲线(见表1-1)。数学上把直线定义为曲率趋向无限小的开放曲线，但在造型上，曲线的性质又不同，所以在分类上应当明确地加以区别。徒手画的线，有随意的感觉，而几何学的线则是规矩、端正的感觉(见图1-2)。

表1-1 线的分类

线	直线	不相交线：平行线
		相接线：包络线、折线、集中的线等
		交叉线：正交格子、斜交格子等
	曲线	开放的曲线：弧、漩涡线、正弦曲线、波形曲线、抛物线、双曲线、垂线等
		封闭的曲线：圆、椭圆、心形、肾脏形等

The understanding of line consists of line in geometry and line in design.

Line in geometry is the orbit formed of continual movement of point. It is a line that is formed by crossed extremely thin surfaces. Planes intersect forming straight lines; curvy planes intersect forming curves; spatial planes intersect forming spatial lines. Line has length, direction and shape but no thickness.

Line in design is relative line with shape, volume, outline and color. When one area is smaller than another one, it is sometimes called line. Take CD-ROM in a mainframe-box for example, it could be a complete surface with details when take it as a independent CD-ROM, however, when compared with the whole mainframe-box, it could be considered as a line.

If shape of point is named point, shape of line is named line, shape of two-dimension surface is named surface, thus line could be divided into straight line and curve, and the latter could be further divided into

opening curve and seal curve (table 1-1). Straight line in mathematics is defined as opening curve with curvature tends to infinitesimal, which is different from curve in form, and should be explicitly distinguished when classify. Free hand drawing line is casual, while line in geometry unfold the feeling of custom and straight (figure 1-2).

图1–2
线的设计

1.3 面 Surface

面有不同的形成方式，主要有以下几种方式。

（1）充实的面形与体量感

封闭的线构成面和封闭的线形成的形，把它的内部涂满即可成为“面形”。它是内藏面形的线形，面形的轮廓由线决定。在充填得满满的轮廓线内的平面形中，可以感觉到充实的体量魅力。如果画个正方形或圆形，然后将其内部涂黑，这个形就有坚实、庄严、稳定、充实的感觉。也可以用广告颜料等无光泽的色填充，至于有光泽的印刷油墨涂刷的稍大的正方形或圆形，更是魅力无穷。这是几何形态整齐饱满的优点，以及“面形”的充实感。从这里可以理解，为什么过去俄罗斯的构成主义者马列维奇把平涂的大正方形面称之为绘画（见图1-3、图1-4）。

除此之外，还有种种的形。一般地，与复杂的形相比，还是单纯而没有空洞或凹陷的形较能感觉出体量的力量及体积的充实感。

（2）封闭线所形成的中空面形

如果是封闭的线，无疑属于二维的形态，只是中空而已。然而轮廓线越细，空洞的空间“面形”的感觉就越淡薄，但“线形”的感觉反而增强；反之，轮廓线越粗，内部空间越窄，则“面形”的感觉就越强烈。

（3）开放线所形成的面形

线的密集排列构成面、这是感觉较弱的“面形”，在体积和体量方面显得不厚重，是一种轻而弱的

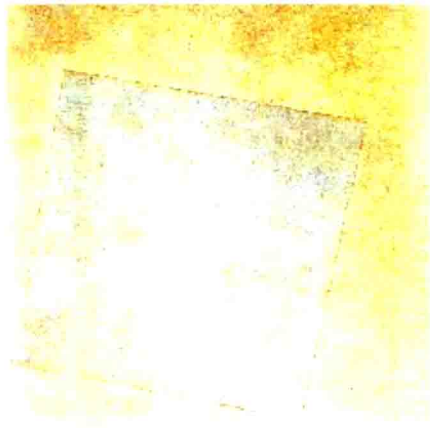


图1-3(左)
白底上的黑色方块

图1-4(右)
白底上的白色方块

“面形”。例如集合细的线段、充满空隙的形就是这样。这种形的要素是由线结合而形成面形的，线与线之间有引力作用。

（4）线的规律运动构成面

线按不同的规律运动形成的轨迹构成不同形式的面。

Surface has different forms which mainly includes the following.

（1）Substantial surface and the sense of weight

Closed lines compose surface and closed lines form shape. Painting its inside fully we get a “shape of surface”. It is an inside shape of surface which forms a line, and profile shape of surface is effected by the line. In the plane shape which is full filled profile line, charms of body and quantity can be felt. If a circle or square is drawn, and its inside is painted black, then this shape has the feeling of consolidation, solemn, stability and substantiality. Advertisement paintings such as some unpolished colors can be used instead of black. Painting relatively bigger square and circle with polished printing ink is extremely charming. It is the neat and rich advantage that geometric form owns and the substantial feeling that surface owns. From here it is not hard to understand why in the past Russian constructionist K. C. Malevich called the daub of paint grand square drawing(figure 1-3,figure 1-4).

In addition, there are all kinds of shapes. Generally speaking, when simple shape and sophisticated shape are compared with each other, it is usually the simple one with no hole or hollow that presents the strength of weight and the substantiality of volume.

（2）Canulate surface composed of closed lines

Closed lines obviously belong to two dimensions, only canulate. The thinner lines of an outline are, the fainter the “shape of surface” of the empty space is and the stronger the “shapes of lines” are. In contrast, the thicker of the lines, the narrower of the inner space and as a result the stronger feeling of the “shape of surface”.

（3）Surface composed of open lines

A concentrated arrangement of lines forms a surface, which is a weakly-feeling “shape of surface”. It is a light and weak “shape of surface”, not thick in volume and weight. For example, gathering of lines, shapes full of space. The factor of this kind of shape consists in surface constituted of combination of lines and the effect of gravitation between lines and lines.

（4）Line’s regular movements form surface

Orbits formed by different regular movements of lines form all kinds of surfaces.

1.4 体 Object

体是面的平移，由一个或多个三度空间组合而成。造型是体的基本特征，它可以是规则的几何形体，也可以是不规则的随意形体。体的适量表达能让空间更为丰厚充实。体的构成形式一般表现为形体和型限。形体占有一定的空间量，其形状、大小决定于空间的形态（大小比例等）（见图1-5）。

Object is the parallel movement of surface, which is made up of one or several three-dimensions. Modeling is the basic element of an object. Modeling can be either regular geometric shapes or irregular casual shapes. A proper presentation of an object enables space to become more substantial. The form of object generally has body and form. Body takes up some certain space and its shape and size are determined by form of space (size proportion ect.)(figure 1-5).

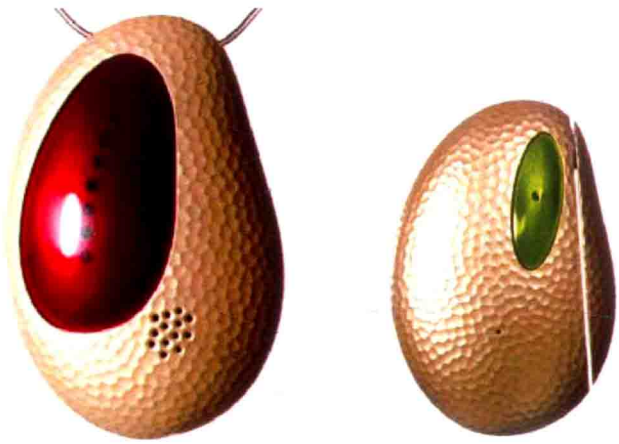


图1–5
体的造型

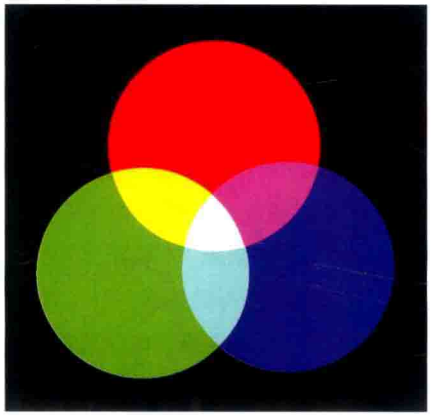
1.5 色 Color

物体表面色彩的形成取决于三个方面：光源的照射、物体本身反射一定的色光、环境与空间对物体色彩的影响。物体色彩形成的主要因素首先是“光”。可以说没有“光”就没有颜色；也可以说，固有色和阴影是由光源色、环境色所造成的，而单一的色相、明度、纯度只是色的因素，因为在它们之间缺少了重要的一环，即环境色的影响。任何色彩都应是在一定的环境中存在的。那么把色彩形成的几个因素联系起来，形成一定的关系，色彩会立刻变得复杂起来。

客观世界的色彩千变万化、各不相同，但任何色彩都有色相、明度、纯度三个方面的性质，又称色彩的三要素。色彩的三要素为色相、明度、彩度。色相（H）是指色彩的相貌，它能够比较确切地表示某种色彩有别于其他色彩的名称，如红、橙、黄、绿等。明度（V）是指色彩所表现的明暗程度，即色彩的深浅差别。明度差别既指同色的深浅变化，又指不同色相之间存在的明度差别。彩度（C）也称纯度或饱和度、艳度，是表示色彩的含灰程度或鲜浊程度的视觉心理尺度，某一纯净色加上白或黑，可降低其纯度，或趋于柔和、或趋于沉重。

色彩混合存在三种形式，即色光混合、颜料混合和色彩并置混合。色光混合也称加法混色，将三原色的色光打在一黑暗房间的黑色屏幕上即可观察加法混色状况。色光三原色为红（red）、绿（green）、蓝（blue），红为正红，绿为正绿，蓝为微偏紫的蓝。色光混合的情况为R+G=Y，G+B=C，B+R=M（见图1-6）。

颜料混合也称减法混色，将色料三原色的广告颜料混合绘于白纸上，即可观察减法混色状况。色料三原色为洋红（magenta）、黄（yellow）、氰蓝（cyan），洋红为鲜艳的粉红，黄为正黄，氰蓝为不偏紫也不偏绿的蓝。颜料混合的情况为M+Y=R，Y+C=G，C+M=B（见图1-7）。



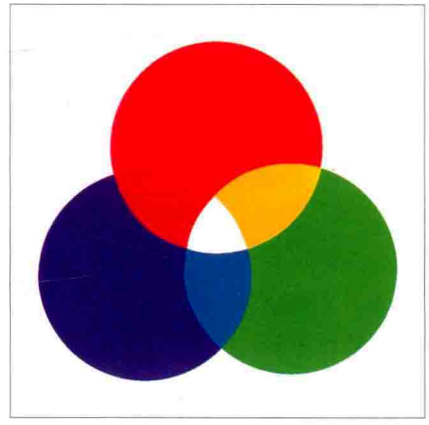


图1-6（左）
色光混合

图1-7（右）
颜料混合

当我们隔一定的距离远看红、蓝色点或色块并置的画面时就会发现，红色和蓝色混在一起变成了紫色，这只是由于空间距离和视觉生理的限制，眼睛辨别不出过小或过远物象的细节，因此把各不相同色块感受成一个新的色彩，这种现象便称为色彩的并置混合或空间混合。

Object's superficial color relies on three aspects: shine of source of light, the object's itself reflection of some certain colors and the influence of colors by surroundings and space. The main factor why colors appear is "light". No "light", no color. It can also be said that innate colors and shadows are created by the color of source of light and the color of surroundings. Simple Hue, Value and Saturation are only factors of colors because among them an important loop lacks, that is the effect of color of surroundings. Any color exists in some certain surroundings. If we connect these factors composing color and form a relationship, color becomes complex at once.

Although colors in objective world are rich and diverse, any color has three characteristics: Hue, Value and Saturation, which are also called three factors of color. Color has three factors: Hue, Value and Chroma. Hue refers to the appearance of color, which can tell value from one color from another, such as red, orange, yellow, green and so on. Value refers to shading value, in other words, the difference between light color and dark color. Value difference not only refers to the change of dark and light degree of one color, but also the brightness difference between different colors. Chroma is also called purity or saturation, which refers to the psychology scale of the contain of grey or the degree of brightness, when a pure color is added with white or

black, its saturation is decreased, either to become soft or to become heavy.

The mixture of color has three forms. They are Additive Mixture, Subtractive Mixture, Juxtapositional Mixture. We can observe Additive Mixture on a black screen in a dark room by shedding light tricolor. Light tricolor are red, green and blue. Red is red. Green is green. Blue is a kind of blue subject to purple. The condition of Additive Mixture is R+G=Y, G+B=C, B+R=M(figure 1-6).

If draw advertisement paintings of paint tricolor on white paper, Subtraction Mixture can be observed. Paint tricolor are magenta, yellow and cyan. Magenta is bright pink. Yellow is yellow. Cyan is a medium blue between green and purple. The condition of Subtraction Mixture is M+Y=R, Y+C=G, C+M=B(figure 1-7).

When we mix red and blue and see it in a certain distance, we will find that the red and blue are mixed into purple. It's only because of the restriction on space distance and visual psychology, and eyes cannot identify details about extremely small or distant object. The phenomenon that the feelings of different colors form a new color is called Juxtapositional Mixture or Space Mixture of colors.

1.6

光

Light

光泽度是由反射光的空间分布所决定的对物体表面的知觉属性。材料表面的组织构造不同，所具有的光泽度也不一样（见图1-8）。细密而光亮的质面，反光能力强，给人以轻快、活泼感和冷感；平滑而无光的质面，由于没有反射光，给人的感觉含蓄而安静；粗糙而有光的质面，由于反射光点多，使人感到笨重、强固、生动；粗糙而无光的质面，因反射光弱而给人稳重加沉重的感觉。

金色和银色是有光泽的色，与一般的水彩广告颜料不同，由于有光泽，所以能产生一种豪华感。金色的种类繁多，其色相也非常丰富，例如有红色相的金色等。金色的色相与其说是黄色，不如说更接近橙色。从古到今，金箔都被造型艺术使用。与金色一样，银色能与许多色调和。银色常常被用做背景色以烘托画面的主体部分。

Glossiness is the perceptual character of an object's superficial surface determined by space distribution of reflection of light. Because of different organizational construction of material's surface, glossiness is different (figure 1-8). Dense and polished surface reflects powerful light which gives people a relaxed, lively and cold feeling; smooth and unpolished surface can't reflect light, so it gives people an implicit and quiet feeling; tough and polished surface reflets strongly, so it gives people a clumsy, stubbon and lively feeling; tough and unpolished surface feels stable and heavy for its weak reflection of light.

图1-8
不同光泽度

Gold and silver are polished colors, which are different from general watercolor poster paints. Due to their gloss, they take on a sense of luxury. Gold has many kinds of colors and its appearance is also diverse, for example, red gold.