

ness. The most striking example of this effect is afforded by a mixture of red and green, which gives a strong yellow effect, although the sum of the two sensations is nearly white.

The study of mixtures has thus given rise to a system of classifying colors which coincides just nearly enough with that derived from the appearances themselves to be generally confused with it, while it differs from it enough to make such a confusion utterly destructive of clear conceptions of the relationships of color. One of the highest merits of the work of Professor Rood is the avoidance of this confusion; and if, for instance, no distinction is made between complementary colors in the sense of those which, when mixed, give white, and in the sense of those whose sensations sum up to white, it is doubtless because here, as elsewhere in the book, logic and scientific precision have more or less suffered from a determination not to repel indolent minds.

As to the question whether scientific investigation is an aid to artistic production or to artistic judgment, the author seems to assume that it may be. In the preface it is asserted that while knowledge of the laws of color "will not enable people to become artists" it may yet help in artistic work, and still more in the appreciation and criticism of artistic work. Now, whether this is so or not there is no chance to discuss in these columns, but a chapter of Professor Rood's book might well have been devoted to the examination of that question, and we regret to find instead of such examination the whole argument of the last two or three chapters resting upon the assumption of what, we think, ought to have been proved. Should the decorative artist regard or disregard Chevreul's 'Laws of Contrast,' Hay's 'Laws of Harmonious Coloring,' and other such tables and treatises? Our author, we think, would say aye to that question, but nearly all artists who are concerned with color would say no; and the more they know of these theories the less, we think, do designers in color respect them. "Red lead with blue-green gives a strong but disagreeable combination; . . . vermilion with blue gives an excellent combination; . . . vermilion with green gives an inferior combination; . . . sea-green with blue gives bad combinations." There are four pages of such statements, arranged in a tabular form and credited to Chevreul (in whose book there are a plenty more) and to Brücke, and tending to no result, for the qualifying terms "good, . . . bad, . . . strong, . . . excellent, . . . weak" at once upset any claim to scientific accuracy, and no color-designer would try more than once to make practical use of such statements. Our author seems, indeed, to be aware that it is not a scientific method he is following here, for he avows his disagreement with one statement of M. Chevreul, both statement and contradiction being given as mere matters of opinion.

The last chapter is devoted to the use of color in painting and decoration; and in this the evident knowledge and right feeling of the author are made useless by the false system adopted—the system of arguing from assumed principles to results, instead of comparing results together with the view of establishing principles. Many of the assertions as to the difference between "painting," as in pictures representing nature, and decoration; as to the difference between transparent color, as in stained glass, and opaque color seen by reflected light; as to the proper

aim and limits of decoration; and as to the proper order of artistic study, will wholly fail to command the adhesion or even the respectful consideration of students of art. And this seems to result wholly from the unfortunate assumption spoken of above—the assumption that the scientific method can be carried beyond the discovery of fact to the laying down of positive laws for practice. "The aims of painting and [of] decorative art are quite divergent" (p. 306). No, but convergent; for, starting from different points, as our author truly says, they reach one and the same result. The objects of the painter of pictures and that of the decorative painter are different; but with different aims they reach the same result, and in all the best work there is in the world there is no saying whether the "painter" or the decorator has been at work.

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NOTES

CSP, identification: Haskell, *Index to The Nation*. See also: Burks, *Bibliography: List of Articles*.

—The current number of the *American Journal of Mathematics*, which is published under the auspices of the Johns Hopkins University, contains an account of a fundamentally new phenomenon in electricity, not explicable by anything hitherto known. The definition of the new action is not yet certainly made out; but it appears to be that if we say that the direction of a galvanic current is from the negative to the positive pole, then a magnet tends to deflect the current within the conductor in the same direction in which it tends to turn the conductor itself. This fact will be a complete surprise to physicists, and its importance to the theory of electricity can hardly be overestimated. The discoverer is Mr. E. H. Hall, assistant in the Laboratory of Professor Rowland, to whose encouragement and assistance the discovery was in a large measure due. It may justly be said that no discovery equally fundamental has been made within the last fifty years. Discoveries so novel have usually been in some degree the result of accident; but in this case elaborate and very delicate experiments were undertaken to ascertain whether or not any such phenomenon could be observed. The new force is exceedingly feeble, so that we cannot predict any practical applications for it.

—The same number of the *Journal* contains several other important papers, including three by the celebrated algebraist Sylvester. All of these afford salient examples "of the importance of the part played by the *faculty of observation* in the discovery of pure mathematical laws." There has been, perhaps, no other great mathematician in whose works this is so continually illustrated as in those of Professor Sylvester. An example of a mathematical proposition known to be true many years before any one succeeded in producing a demonstration of it, is the familiar fact that on any possible map, however complicated, the different countries may be distinguished from those which adjoin them by painting them in only *four* different colors. This has been known for a long time, but the first

proof of it is given in the present number of the *Journal* by Mr. A. B. Kempe, well known for his investigations into linkage. The number also contains an explanation of the "curved ball" of the base-ball players, and a method for representing a space of four dimensions.

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Studies in Deductive Logic.

By W. Stanley Jevons, LL.D. (London and New York: Macmillan & Co. 1880.)

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William Stanley Jevons (1835-1882) was a leading English economist and logician. He was professor of logic, political economy, and philosophy at Owens College from 1866 until 1879. Jevons was the author of several books on logic and economy, and was also interested in political and social reform.

—Some forty years ago the two mathematicians, De Morgan and Boole, commenced a reform of formal logic. Their researches were continued by a number of other excellent thinkers (Mr. Jevons among them) in different countries, and the work is now so far advanced that the new logic is beginning to take its place in the curriculum of the universities, while many persons have imagined that some almost magical power of drawing conclusions from premises was to be looked for, and that logic would prove as fertile in new discoveries as mathematics. Concerning such hopes Professor Sylvester says: "It seems to me absurd to suppose that there exists in the science of pure logic anything which bears a resemblance to the infinitely developable and interminable heuristic processes of mathematical science." "To such a remark," replies the author of the book under notice, in his preface, "this volume is perhaps the best possible answer." A more exaggerated pretension never was made. The book is a convenient manual of exercises in elementary logic, tinged with the author's peculiar views, of which there will be different opinions, but, at any rate, sufficiently sound to be useful in the class-room. But if Professor Jevons were to penetrate only a little ways into the heuristic world of the mathematicians—an excursion quite worth the while of a logician—were to learn what discoveries are there made every month, and what sort of a stamp a proposition must bear to be considered, in that field, as really new, it is to be hoped that he would feel something different from self-satisfaction at recollecting that he had set up anything in this little volume as worthy to be compared with the triumphs of a Sylvester. Logic, inductive and deductive, is an important discipline, probably more important than the higher mathematics, just as the multiplication-table is more important than the calculus; but very, very few are the new problems which have ever been solved by the regular application of any system of logic. That part of logic which can best compete with mathematics in the discovery of new truths is the complicated theory of relative terms. But even there the comparison would be very unequal between what is only a branch of mathematics and the whole body of mathematics together. The solution of problems used to be considered as the glory and touchstone of the mathematician; in our time, the aim is rather at the discovery of methods, and we might perhaps look to the logician to produce a *method* of discovering methods. But the main advantages which we have to expect from logical