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ON THE COLOR SPACE OF
SIGFRID FORSIUS 1611

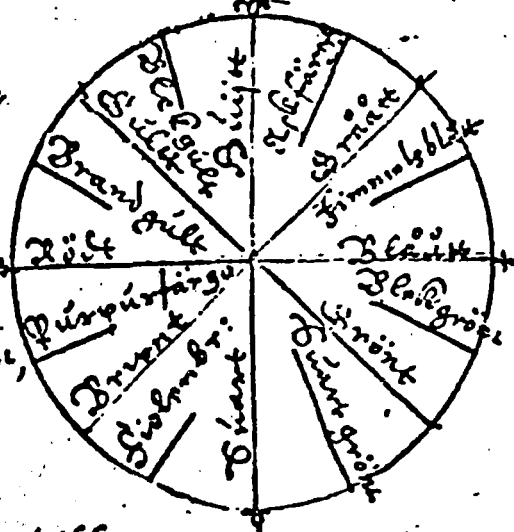
Robert L. Feller
and
Åke S:son Stenius

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On the Color Space of Sigfrid Forsius, 1611

färgen af rött, af rödgulne smullen färgen
 af gult: Brunt gult smullen gult af rött.
 Brunt smullen Rött af svart: färgen
 färgen smullen Rött af brun: af färg
 Brunt smullen brun af svart.
 Sälgen på af en andra färgen, smullen
 färgen af blått, gränt: smullen färgen
 af gränt af färgen: smullen gränt
 af blått af smullen blått: Of på en
 under delan Svart smullen blått af
 svart: Blått grön smullen blått af
 grönt, af svart grön smullen grönt af
 svart. Det man allt när sig i fram
 färgen.

Man då man när sig
 trösta vill färgen
 med infärgen af
 färgen, så utgå
 ifrån färgen
 Mindre färgen, som
 är Rött, blått, grönt,
 gult af färgen, af
 färgen af svart, af
 i färgen grön färgen
 antingen när man till.



färgen igenom sin blodfärg, eller till svart
 igenom sin rödgulne; ända att på färgen

by Robert L. Feller
 and
 Åke S:son Stenius

The history of early color systems in two and three dimensions has received considerable attention in recent years. In 1948, Schmid described the rare and practically forgotten color circle that Moses Harris published in 1766 (F. Schmid, *The Art Bulletin*, 30, (1948) pp. 227-230, *The Practice of Painting*, London, Faber and Faber, 1948). Faber Birren, who was respon-

sible for a handsome facsimile edition of the Moses Harris work, has traced the development of Harris' and other diagrams for color space, extending examples as far back as Waller's diagram in 1689 and Newton's circle for additive color mixtures in 1704 (Moses Harris, *The Natural System of Colors*, facsimile edition, privately printed, New York, Whitney Library of Design,

1963; F. Birren, *The History of Color in Painting*, New York, Reinhold Publishing Corporation, 1965; F. Birren, *Color, A Survey in Words and Pictures*, New York, University Books, 1963). Evidence suggests that rather sophisticated diagrams for the rules of color mixing extend even further back in history. A special exhibit at the First Congress of the International

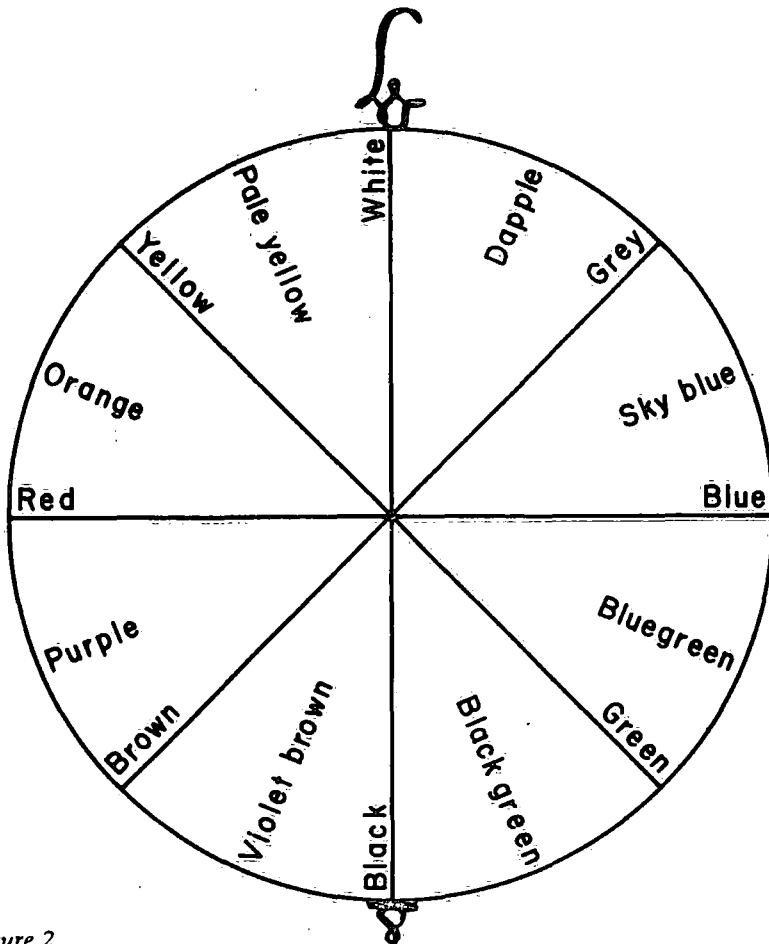


Figure 2

And there are three things needed for a color to be noticed: (1) The outermost part of an object, (2) Translucency and clarity, since in darkness nothing can be seen, (3) A moderate distance, because objects that are far away cannot be judged by their color.

Among the Colors there are two prime colors, white and black, from which all others have their origin. The white color belongs to the cold, the weather and the dryness. The black to the cold, the dampness and the putrefaction.

In the middle between these colors, red since olden times has been placed on one side and blue on the other one: Yellow between white and red, and pale yellow between white and yellow: Orange between yellow and red. Brown between red and black: Purple color between red and brown: and violet brown between brown and black.

Then on the other side, between white and blue is gray. Between white and gray is ash color: Between gray

and blue is sky blue. And on the lower part green between blue and black. Pale green between blue and green and black green between green and black. This is all seen in this Figure (Fig. 2).

But if you want right to consider the origin and relations of the colors, you should start from the five principle middle colors which are red, blue, green, yellow, and gray of white and black (Figure 3). And their gradings, they rise either closer to white by their paleness or to black by their darkness; albeit they are (as above has been made known) related to one another as previously shown. Because red rises to white through pale red (pink) and skin color: to black through purple, brown, violet brown and black brown. Similarly yellow relates towards white through pale yellow, wooden and wheat color: To black through orange and dark yellow. Equally blue rises to white through sky blue and pale blue, like Dutch cloth: And to black through dark blue

like indigo color that has some brownish in it. So rises also green towards white through Spanish green and pale green: To black through blackgreen. Gray approaches white by the color of Lübeck gray and limestone and dapple gray color: To black through mouse gray black gray and pale black.

And this is the correct relationship of colors, that in their number agree with that of the planets as do the lower colors with the five membranes of the eye, and with the five senses. All this can be seen from the accompanying figure (Figure 3).

And so much about the colors."

Of the two diagrams represented by Forsius, the first is a color circle in two dimensions (Figure 2), an arrangement of colors which we may assume has been employed by others before him, for he says, "In the middle between these colors red since olden times has been placed on one side and blue on the other: Yellow between white and red, and pale yellow between white and yellow: Orange between yellow and red . . .". This diagram is not very close to the arrangement of complements in modern color circles nor is it a proper cross section of the other diagram.

Forsius' second diagram (Figure 3) represents color space as a sphere, remarkably close to the 1810 diagrams of Runge and one that we might construct today. White is at the top of his sphere; black at the bottom. Around the circumference, the colors are arranged essentially according to color-perception space arising from the ideas of black-white, red-green, and yellow-blue.

Little seems to have been written about Forsius; in the two biographies found, one makes no mention at all of his *Physica*. The other reads as follows:

"The Finnish astronomer and clergyman, Sigfrid Aronus Forsius, was born in Helsingfors, Finland, shortly after the foundation of the town in 1550. He studied, mainly astronomy, at German universities, but also in Uppsala, Sweden, and was ordained to the priesthood in 1597. In 1601-02, he performed mapping in Lapland, the

most northern part of Finland. He was then for some time parson in Kimito, Finland. After varying fortunes, he was in 1608-10 professor in astronomy in Uppsala. In 1613, he became parson in Stockholm, but was suspended in 1615. From 1621 to his death in 1624, he was parson in Ekenäs, Finland.

Sigfrid Forsius is mostly known as an author in prognostics, in astrological predictions and above all for his almanacs. He was the first one who worked out almanacs valid for districts in Sweden (Stockholm) and Finland (Abo); previous almanacs had been translations from German with indications of time (for instance, sunrise and sunset) that were not valid for Sweden and Finland. Forsius was one of the most remarkable representatives in Sweden of the Neo-Platonist mystics inspired by the Swiss philosopher and alchemist Paracelsus. He is said to have been quarrelsome and adventurous of nature.

Sigfrid Forsius wrote his *Physica* in 1611 and published a collection of "Religious psalms and songs" in 1614."

The sphere in Forsius' manuscript is the earliest diagram that we are aware of that corresponds to present-day arrangements of color space. Perhaps Forsius himself is the inventor for he introduces it, immediately following his description of the first diagram, saying: "But if you want right to consider the origin and relations of the colors . . .".

EDITOR'S NOTE: It is of interest, especially for those who attended the Color 69 meeting in Stockholm in June 1969, to note that the exhibit referred to in the second paragraph of this article was the work of the Swedish Color Center, whose director, Anders Hard, also referred to the Forsius manuscript in his paper "Quality Attributes of Colour Perception," presented at that meeting.

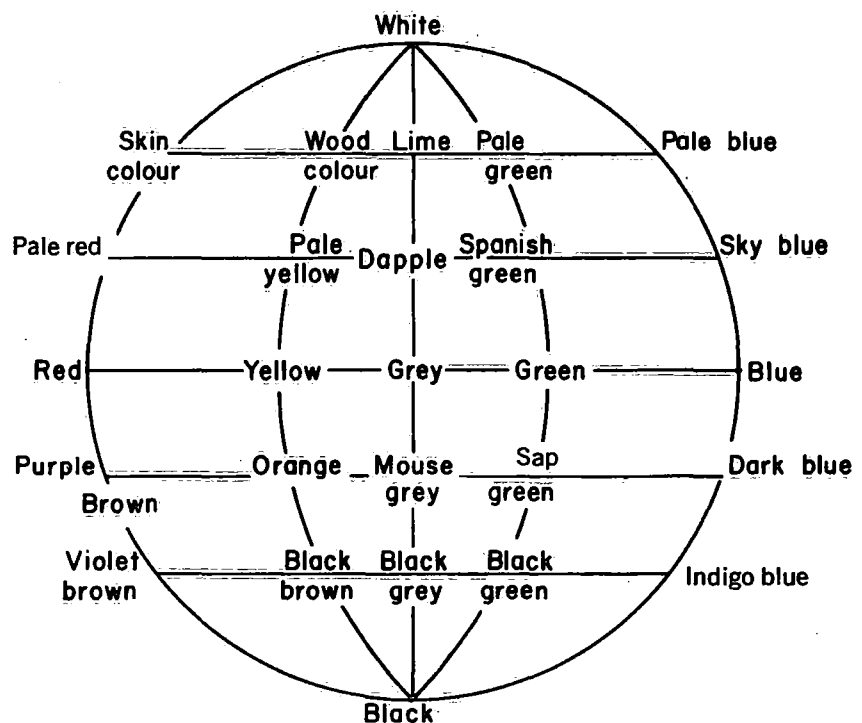


Figure 3

THE AUTHORS

Dr. Robert L. Feller, Senior Fellow, National Gallery of Art Research Project, Mellon Institute, Pittsburgh, Pa., is very active in the field of color, with particular emphasis on early artist pigments and restoration of paintings and color fading of those pigments. He is a Fellow in the International Institute for Conservation of Historic and Artistic Works, and is an editor of its Art and Archeology Technical Abstracts, and is the editor of the bulletin of the American Group of the Institute. He is also an active member of the Inter-Society Color Council.

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