4a 1

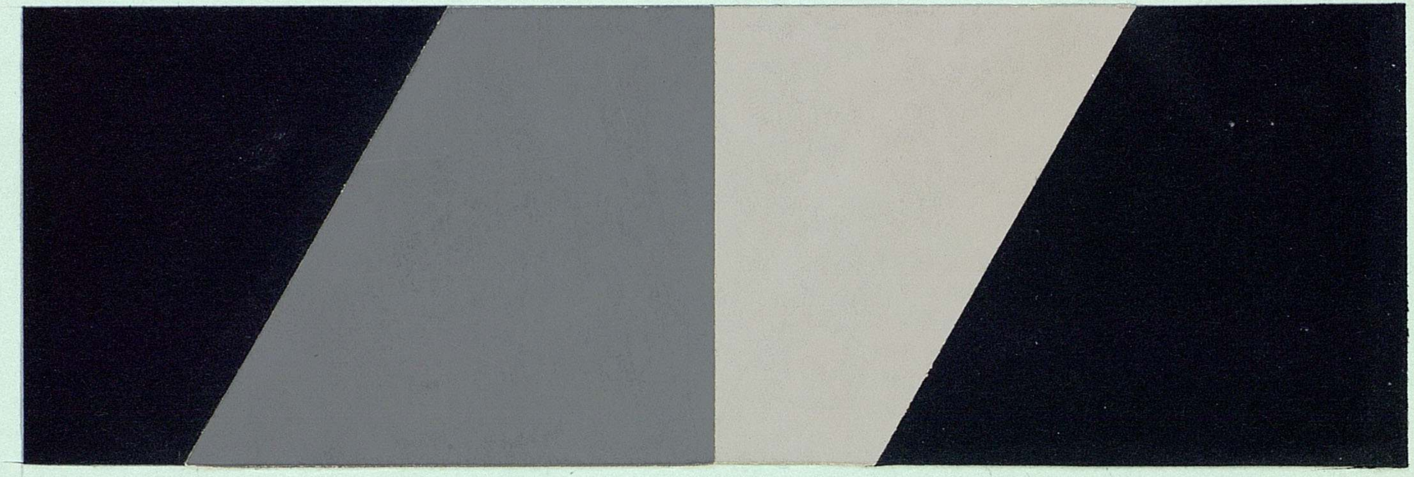

Fig. 46

bianco

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It is perhaps useful to expose briefly the way in which the transparency equations have been derived.

The starting point was: (1) the description of transparency as the phenomenal scission of a color into two colored layers, one transparent and the other seen beyond the first one, and (2) the hypothesis of G.Moore Heider, according to which the scission colors are such that when fused together they ~~give~~ yield again the stimulus color. Thus it was clear that Talbot's law, which expresses the quantitative relation between fusion color and component colors, also expresses the relation between stimulus color and scission colors.

If the achromatic colors are fused with the color wheel, the albedo of the fusion color is, according to Talbot's law, the weighted average of the albedos of the component colors, the weights being the quantities of the component colors. In other words, if the albedos of the two component colors are a and b and the quantities are respectively m and n, and c is the albedo of the fusion color, then

$$c = \frac{ma + nb}{m + n}$$

or, substituting proportions for absolute quantities
$c = \alpha a + (1-\alpha)b$, where α and $(1-\alpha)$ are the proportions of the two colors which have been used to form the mixture.

According to the proceding considerations, the same equation expresses the phenomenal scission of a color in the transparency phenomenon. If p is the albedo of a stimulus color which splits phenomenally into two colors a and t (where t is the color corresponding to the transparent layer and a the color of the layer seen through it), the relation between the albedos of the stimulus color (p) and of the scission colors (a, t) is given by the equation

$$p = \alpha a + (1-\alpha)t$$

where α and $(1-\alpha)$ are the proportions (f.ex. $\frac{1}{4}$ and $\frac{3}{4}$) according to which the stimulus color is distributed to form the scission colors.

And since the greater the quantity of color going to the transparent layer, the greater its density and the less its transparency, it turns out that $(1-\alpha)$ measures the degree of density of the transparent layer, and α its degree of transparency.

There are two unknowns in this equation, α and t, and therefore the equation is undetermined; but transparency implies phenomenal scission of two regions, p and q (see Fig. 2); thus, for the region q as well, the same relation between the albedo of the stimulus color and the albedos of the scission colors is valid, that is

$$q = \alpha a + (1-\alpha)t \ .$$

And if α and t are the same for both regions, that is, the transparent layer is homogeneous (a condition which is verified frequently in the phenomenon of transparency and always in the case of the shadow), the system of the p and q equations is determinate and its solutions are

$$\alpha = \frac{p-q}{a-b} \qquad t = \frac{aq - bp}{(a+q)-(b+p)}$$

where α is the coefficient of transparengy (if t is constant, as in the case of the shadows) and t is the color* (the albedo) of the transparent layer.

quazione
$$p = \alpha a + (1-\alpha) t \qquad (\text{p. es. } \tfrac{1}{4} \text{ e } \tfrac{3}{4})$$
in cui α e $(1-\alpha)$ sono le proporzioni in cui il colore stimolo si suddivide fra i due colori di scissione.

E poiché ~~la quantità di colore che va allo strato trasparente cresce è la trasparenza~~ quanto maggiore è la quantità di colore che va allo strato trasparente, tanto maggiore è la sua densità e tanto minore la sua trasparenza, ne deriva che (ceteris paribus / parità delle altre condizioni) $(1-\alpha)$ misura il grado di densità dello strato trasparente, cioè α misura il grado di trasparenza.

Nella suddetta equazione le ~~incognite var~~ incognite sono due α e t, e quindi l'equazione è indeterminata. Ma la trasparenza implica la scissione fenomenica di due regioni, p e q, e ~~per tutte e due queste regioni si~~ quindi anche per la regione q ~~si~~ vale la stessa relazione fra le albedo del colore stimolo e quelle dei colori di scissione, cioè
$$q = \alpha a + (1-\alpha) t$$
e se gli α e i t sono uguali ~~per~~ nei due casi, cioè lo strato trasparente è unitario (~~cosa~~ condizione che si verifica molto frequentemente nel fenomeno della trasparenza e sempre nel caso dell'ombra) il sistema delle due equazioni di p e di q è determinato e le sue soluzioni sono
$$\alpha = \frac{p-q}{a-b} \qquad t = \frac{aq - bp}{(a+q)-(b+p)}$$
~~soluzioni~~ in cui α è ~~il~~ coefficiente di trasparenza (se t è costante, come ~~nel caso~~ risulta essere nel caso dell'ombra) e t è il colore, ~~detto~~ cioè la albedo, dello strato trasparente.