50 SHEETS BLUE
SIX SHEETS AND AN ENVELOPE WEIGH LESS THAN 10 GRAMS

Comments -1- on Beck and Bradbury Paper

1. Preliminary considerations.

a) The authors do not refer exactly to my equations (1) and (2), that is

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

(2) $q = \alpha' a + (1-\alpha') t'$

I am using my own symbols[1] However the essential point is that in the general case α and t can be different in the two equations. It is important to state that using the spectrometer or a filter, $\alpha = \alpha'$ and $t = t'$, while using surfaces of arbitrary reflectance it is possible to get values of the four variables that are impossible to obtain in the above situations.

(1) Beck and Bradbury use a b c d instead of a p q b. But there was a good reason to differentiate between the loci of transparency (b, q) and the ground (a, b). P is the region that becomes transparent on A, and Q on B. So, the meaning of an expression like p q a b (= p > q > a > b) is immediately clear.

Only when $\alpha = \alpha'$ and $t = t'$ it is allowed to solve the couple of equations (1) and (2) and obtain the solutions for α and t.

With the above conditions, the four ~~necessary con~~ "restrictions" are always respected.

The above conditions ($\alpha = \alpha'$ and $t = t'$) are defining balanced transparency (transparency being – at least from the physical standpoint – equal in the P and in the Q region, and so are equal colors of the transparent layer in both regions).

B and P.'s experiment 1 is interesting as studying unbalanced transparency, that is ~~the~~ transparency appearing when one or more constraints are not respected. I gave some demonstrations about constraint I and II and neglected constrains III and IV[1] because it was not possible to give a perceptual demonstration about them. However the above explanations should suffice to show that the existence of cases of unbalanced transparency are not proofs against my theory.

(1) Metelli', 1975 p.

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A last remark is perhaps useful. People are not asked to express judgements but just to describe what they perceive. The distinction is important because otherwise a theory is very ~~ridiculously~~ imposed to the reader. The hypotheses supported can be discussed only after having discussed the results of the experiments.

Experiment 1 There were two sampling problems, ~~the first~~ regarding the figural and the color conditions. The sampling of the figure has not been considered: one of the ~~infinite~~ great number of configurations giving rise to transparency has been chosen. According to the author of the present note, a good criterion would have been neutrality towards transparency, that is to choose a figure not suggesting transparency when drawn ~~like~~ linearly, as Fig 1 (see Metelli 1974 p. ...) in order to avoid undesired effects of figural conditions. * ⊞

As for the sampling of the colors

-4-

B and P selected 4 shades of gray equally spaced in a physical continuum from very light to very dark and generated the 24 possible permutations of the 4 intensity values on a computer screen.

There are some interesting points about the experiment: a) According to the Authors it seems that $\alpha = 1$, being a value not far from the acceptable ones (limiting value) is not to be considered a "violation" of constraint 1. Clearly enough, apart from the case where $p=a, q=b$, $\alpha=1$ is a value outside the limits of the episcotister model, and therefore not the limits of balanced transparency. Its characteristic position in Rinaldino's diagram depends on the corresponding t value. In fact it is not a violation because $t \neq 1$, and therefore the above algebraic deductions could be strong in order to be effective (formulas for α and t). X (some precedents) are not addressed

However the choice of the figure has been unhappy for two reasons a) it is an easily inverted figure and b) it is a typical figure giving rise very easily to partial transparency. Therefore the instructions given to the subjects last to be complicated.

b) Besides the above described series of 24 displays, another series ~~was~~ has been used using four different colors for testing the effect of different signal conditions on the perception of transparency. Strange enough, instead of using the same figure ~~and respective result~~, they used a practically equal figure, still of two superimposed rectangles included in a square, and ~~of~~ as a comparison, a figure used by myself, where transparency is not compulsory. The configurations differ in "violating and satisfying" the 4 constraints.

c) Subjects were instructed to answer "not transparent" if by inversion another region appeared transparent, or if partial transparency ~~took~~ was perceived. This does not seem a good procedure, because by change of attitude the same subjects could perceive the type of transparency

expected by the R.A.-6-. This point criticizes the coherence of theoretical results.

d) A last point of the procedure that I consider not satisfactory is the limited time (2 seconds) fixed for reading figures. A longer time could have given more reliable results, and more interesting also, as more than one perceptual result could occur. The danger of "judgements" not immediately based on visual impression would have been negligeable.

Risultati

Dalla tab. 1 si leggono i risultati (casi di trasparenza percettiva con i limiti sperimentali) per le singole configurazioni elencate con riguardo

In tab 1 results are given (N° cases of transp.) ordered according to violations of constraints.

The first noteworthy result is that violations of constraints are very few. There are only two cases where the number of

violations is relevant (6, 13), both violations of constraint 1: b > a > p > q and q > p > a > b.[1] It has to be stressed that the study regards violations I and II constr. chiefly, as there are not violations of III and violations of IV constr. seem not to have any effect.

Since violations of constraints can only take place when Ten transparency is unbalanced, we are facing the interesting fact that constr. I and II seem to act also in this case. It has to be inquired if unbalanced transparency theory accounts for this fact, and to the fact that constr. III and IV do not seem to have any effect (see Appendix).

As for the experiments returned in order to test if lateral constrictions are co-determining transparency

(1) B and P. ascertain that if lateral constrictions strongly suggest transparency, tr. can occur also against constr. 1; but they do not explain why this happens in configurations 22 and 27 but not in conf. 11 to 16.

rency, the result confirms the expectancy
There are more impressions of transparency
and more cases violating constraints with
Fig 3 I than with Figure 3 II, and Figure 5 explain
the effect with a better organization in case of
non transparency with the more regular Fig 3 II.
Little difference in lightness seem to favorite
the violation of constraints.

Supplementary experiment 1. The purpose was a) to
test replicability of results of exp. 1, b) to study the
effect of differences in lightness ~~magnitude of difference~~ in
violation of constraints, c) to test the effect of violation
of constraint IV.

~~Risultati dell'esperimento 1 sono a) la conferma~~
~~della possibilità di numerose violazioni del~~

The results of the experiment are a) the confir-
mation of the possibility of violating constraint I.
(14 cases, but only in one display (a & b). Why?
b) it appeared clear that the cases of perception
of transparency violating constraints I and II vary
inversely with the salience of violation 3) ~~Violating~~
~~Even of~~ constraints III and IV seem not affect
impressions of transparency.

Supplementary experiment II. The experiment was made in order to establish which surface appears transparent and overlying with invertible configurations. The result, already obtained by Petter (1956) is that surfaces that differ in lightness tend to join and form the transparent layer.

Filter model. B. and P. seem not to be aware that the episcotister also acts as a filter, and that episcotister and filter function alike if the filter is non-selective. Both act subtractively (the episcotister also subtracts a part of the light reflected by the surface behind it), as well as additively (both add the light transmitted and the light reflected by the filter). B. and P. prefer to consider the more complicated model of the filter where light is passing the filter twice. But if the case of light passing once is considered, filter and

epicotiter fractionalible.

Experiment 2. The results are very interesting, indicating that the impression of transparency depends on impressions of lightness of the colors involved, not on physical measurements. But why, differently from all the other experiments, here partial transparency was used? [And why only one triplay was used while in the other, less interesting cases, until 24 different triplays were used?]

And what ~~do the A.A.~~ mean the authors by asserting that "if one set up an episcotister, judgements of transparency would be inaccurate"? I already remarked that B and P. arguments do not justify to use in an arbitrary way a formula, instead of declining it. [However] I find it not very satisfactory when the A.A. say "~~we believe that with complete transparency... we could~~ "Though we have not conducted any experiments...

We conjecture that ~~the~~ substituting lightness values for reflectances in Equation 3 will correctly predict the perceived degree of transparency. Why don't they make at least one experiment?]

As for the general conclusions the present Author by no means agrees with B. and P. The ~~last~~ above Authors assert that perceptual transparency is a function of the stimulus information indicating that the overlying surface is not opaque and transmits as well as reflects light. But this is only an assertion: They go on in saying that "transparency is indicated by an alteration in image intensities produced by the overlying surface" but in all ~~the~~ B. and P.'s displays there is no overlying surface - or better the overlying surface is a product of the splitting process, which is denied by the above Authors. They go on saying

that it is indicated by the image distortion occurring because of the light refractions at last in the displays there is not image refraction, and by the cues provided by figural configuration, depth and motion", while there is neither depth nor motion, and, as I have in Fig. or Fig there can be perception of transparency also if figural configurations are neutral.

Then why and when does transparency occur? At the above A.A. but elsewhere, when transparency gives rise to a better, more balanced and stable perceptual solution.

If other experiments will confirm the finding that transparency is a function of perceived lightness, then it just means that the splitting process takes place at a higher level, when stimulation effect is already translated in perceptual values. As I showed in an earlier paper (1982), formulas and constraints expressed in physical values are however valid to draw inferences about perception, until

inferences are ordinal (>, <).

According to Bent P. figural conditions should be primary, and the possibility of transparency of patterns of lightness would be checked to see if they are consistent with transparency. The hypothesis appears to be reasonable, but what is primary should be also more ~~constr~~ coherent, while figural conditions seem more ~~easily~~ easily to be overcome by strong alterations than color conditions are.

As for Adelbert's effect about color vanishing in apparently moving circles, a phenomenon that should have been discussed in the paper about colored transparency, promised by the A.A. — I don't see what ~~one the distinction could be between~~ is the advantage of using the expression color vanishing only if the colors of the layer seen through transparency and the color of the transparent layer can give as a result the reduction color: we see color vanishing also when the above relations are not the predicted.

the ones. The distinction made by B and P. has no explanatory value.

One last word about theory. Why should the description "color splitting" not be valid if the phenomenon occurs at a higher level? B. and P maintain that it is "a higher order, more cognitive encoding of the structural information in a stimulus" and that "color seissioning is the result of an encoding of a stimulus in terms of a color of an opaque surface and a color of a transparent surface". But on the contrary, the seission has to precede the encoding: with this description the very problem appears to be already solved when the processing of information occurs.

Of course the A.A. are not the victims of such a deception. They give a list of cues or sensory support of the seission. But the defect of this way of proceding is that no one of the cues is a necessary condition: they can all be absent when transparency occurs.

A typical example ~~of~~ are the qualities of colors. Orange can suggest a mission as we perceive red and yellow in it. But all the examples of the paper here discussed are pictures with various shades of gray; ~~and~~ We never perceive white and black as gray.

Speaking of illusions

Definition of illusion

2 ways of considering perc. illusions

a) exceptions

b) alarm signals: differences between perceptual and real world becoming visible

Natural Tendency to naive realism: ignore the above difference – what we see is the real world

Way of preserving our realism. The example of a car accident. Perceptual apparatus functioning exactly but had not been used the right way.

Perceptual illusions – cases where the above explanation does not function

Example of the Gestalt W. Crisis of our naive realism.

a) looking for the solution of a special phenomenon

b) discovering that not only the illusory perception but only the trustworthy one puts a problem

Widening of the problem – function of perc. illusions

The perceptual world is a set of problems to be discovered

Examples: how, studying illusions, from a limited special problem a wider insight develops.

a) Transparency (apparent)

Physical transparency neither necessary nor sufficient condition to perceive transparency

Obviously – the visual system does not receive any information whether light rays stimulating the retina are passing through a transparent medium or not.

Then, what gives rise to the impression of transparency? Demonstration. Transparency depends on complex stimulation (gestalt phenomenon) as local stimulation did not change.

Result of studying the conditions giving rise to transparency: valid for apparent as well for real transparency.

b) Apparent rest

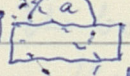
Typical example of special problem stemming into a general one

1) 2) Coercitive impression of a resting circle successively visible in all of its parts.

Story of the illusion in different stages

(a) looking for necessary conditions through systematic variation: one part of the border has to correspond to the trajectory of a point. (illusion with rectilinear motion also).

(b) New question "which modifications on the proximal stimulation (retina) are caused by the motion of the target?"

Reg.  region stimulated by a stimulus decreasing from one side and increasing from the other.

Non-illusory target: same effect.

Problem seems to have disappeared

(c) Why do we see in both cases a rectangle moving on a circle and not the whole target rotating?

NB The problem has widened: it does not regard the illusory situation only, but the non-illusory as well. And the problem is general: it regards the perception of a moving object,

(d) what happens on the retina when an object is moving on a ground (simplest situation: homogeneous figure on an homogeneous ground).

Stimulation corresponding to the figure decreasing Regions stimulated
on one side and increasing on the other. Ground the contrary. Increasing and decreasing of homogeneously stimulated regions, not motion on the prof. stimulation.

~~Encounter with a resting figure. When moving figure passing in front of the resting~~

But the border - abrupt change of stimulation between the two regions - is wandering. (In the middle the figure is resting!).

Encounter with ~~another~~ resting figure (moving figure passing in front). Complicated exchange of de-

creasing and increasing of both figures, ~~becoming seemingly a bi-color object changing its form~~. But not different regarding borders. Borders of proj of moving figure, moving, borders of projection of resting figure, resting.

(c) Back to the illusory figure.

What happens of the borders of the apparently resting part of the configuration, they are increasing and decreasing but resting as the borders of the resting figure do. Then ~~the~~ we are [illegible] in the spiral case of our figure as in the general case of moving objects with 2 types of borders: Kinetically active because they give rise to the perception of a moving figure, and Kinetically non active.

Our figure has both type of borders – therefore its borders are Kinetically non homogeneous. And what happens: we perceive two figures each with Kinetically homogeneous borders. ~~Just rise~~ – in the retinal projection is

But it is just what we are seeing in the case of ~~two~~ a figure passing in front of another figure

c) The disappearing hole

Demonstration

Demonstration without apparatus

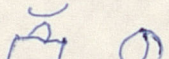
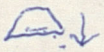
~~Re~~ Result of varying conditions. Only necessary condition: homogeneity of surface behind the hole (other conditions favoring or hindering the illusion of contour).

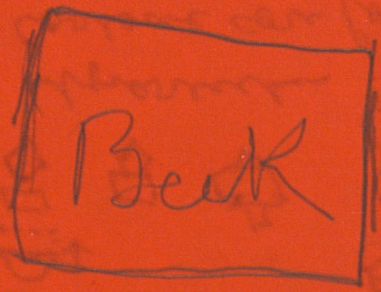
As usual we have to see what happens on the proximal stimulation. Difference between a piece of paper pasted on a cardboard and a hole. Difference if the insides of the hole is inhomogeneous (retinal disparity (if seen with both eyes), difference in focussing. No difference if bottom homogeneous But why do we see in both cases a surface and not a hole. One sided action of the contours But why the border acts this way, is still an open question. And then, a strange exception: if the hole is dark black, notwithstanding its form

Figure!

Stick

Displays

1. Mallor Layer
2. Transparency (orient)
3. No Transparency
4. 
5. 
6. Figura 
7. 
8. 
9. 
10 apparecchio
11 Cartone con foro



Fame

writing pad

18 SHEETS

Transparencia parcial

$$\alpha = \frac{c-a}{b-a} = \frac{q-a}{p-a}$$

~~Trasparenza~~

Riflettanza (o luminanza) con l'episcotister e con il filtro

Sembra che se il filtro non è selettivo i due casi si equivalgano

α corrisponde alla trasmittanza

t corrisponde alla riflettanza del filtro

In tutti e due casi abbiamo il problema del doppio passaggio (andata e ritorno)

Nel caso del passaggio unico (illuminazione laterale), si avrà nel caso del filtro

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

o simb. Beck $ta + (1-t) f$

Sembra che anche qui vi sia un rapporto inverso fra passaggio e riflessione: quanto più passa, tanto meno viene riflesso.

infatti se $\alpha = 1$ la riflettanza non agisce perchè passa tutto

se $\alpha = 0$ il coefficiente della riflettanza è 1 (è una superficie opaca con riflettanza t (o f.)

Sarebbe interessante una esplorazione sperimentale del diagramma di Bernoudis per vedere dove si localizza la trasparenza non-equilibrata.

Ad ogni modo, le correzioni per le prove di non-trasparenza se si violano le cond. necessarie? In realtà si possono violare in caso di trasparenza non equilibrata. Cioè se si vede la trasparenza si ha $\alpha \neq \alpha'$; se non si vede? Importante vedere del tipo di trasparenza si intende se $\alpha \neq \alpha'$, e anche se $t \neq t'$.

che cosa significa che un caso di trasparenza viola una delle condizioni necessarie?

I e II $\alpha \leq 0$, $\alpha \geq 1$ assurdo, cioè $\alpha \neq \alpha'$

III e IV $t \leq 0$, $t \geq 1$ $t \neq t'$

Si tratta semplicemente di un caso di trasparenza non equilibrata. Le 4 condizioni agiscono necessariamente soltanto nel caso della trasparenza equilibrata per equaglianza di trasparenza (I e II) e/o per uguaglianza di colore delle strati trasparenti (III e IV)

Sta il fatto - interessante - che le I, e II valgono anche nella trasparenza non equilibrata.

La trasparenza equilibrata si ha necessariamente con l'episcotistia o con un filtro, non con i mosaici dove è possibile anche la trasparenza non equilibrata.

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April 6, 1984

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Dear Fabio,

Sorry for the delay in answering your letter but I just returned from an extended trip.

I hope the following clarifies my thinking. Instances of balanced transparency are mainly encountered in the environment. Because of this, the visual algorithm that checks whether a pattern of intensities is consistent with a perception of transparency embodies a constraint of balanced transparency. That is, both the degree of transparency and the reflectance of the transparent surface is taken to be the same throughout. This is the reason that the order and magnitude relations you have identified predict the perception of transparency. When these constraints are violated, the perception of transparency is mathematically underdetermined. Though underdetermined, we experience I believe a specific percept. That is, we see an opaque surface of two differing reflectances or a transparent surface of two differing transparencies (unbalanced transparency). (Remondino defines the solution space for unbalanced transparency.) We do not as yet know the factors which determine the specific percept.

The perception of balanced transparency depends on what an observer sees and not on the physical conditions producing transparency. It is the perception that the degree of transparency and reflectance of a transparent surface are the same throughout. In my experiments subjects were instructed to report transparency only if the underlying surfaces were seen through a single overlying transparent surface. That is, the subjects were asked to report the underlying surface as transparent only if they saw balanced transparency. My research assistant reported that in a few instances a subject reported that the degree of transparency differed in the two halves of a stimulus. He was then instructed to judge the stimulus as not transparent. Therefore, I interpret my experiments as dealing with the perception of balanced transparency.

I hope we will have the opportunity to discuss this further in person. I hope that you and your family are all well.

With my very best wishes
and regards,

Jacob

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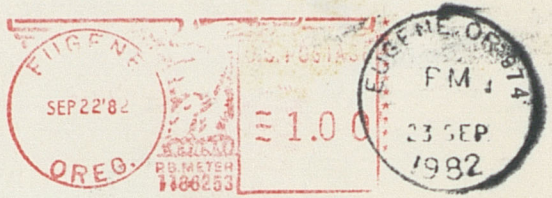
Air Mail

pint = punto cruciale
nodo cruciale



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