

Perceptual grouping between successively presented stimuli and its relations to visual simultaneity and masking

It is an interesting research which deserves to be published. Its main merit is to have studied quantitatively, with rigorous method, and with new variations, a well known phenomenon, obtaining interesting results which can be studied also from different points of view.

Its main defect is the lack of direct knowledge of fundamental but not recent bibliography.

The problem is not very clearly stated. Perceptual grouping between successively presented stimuli has been studied and demonstrated already in the classical paper of Wertheimer (see references) and is by no means new. But what the Authors have studied is the influence of a temporal interval on spatial grouping.

As a matter of fact the experiment by O. and Y. appears at first trivial. A matrix of 4x4 elements (or better sub-matrices) may be mainly perceived as 4 rows or 4 columns. If conditions are equal an alteration of these two structures is generally perceived. If the distance among rows is increased (critical distance among elements), rows are more and more dominating, as favoured by the factor of nearness. The contrary happens if the horizontal distance (distance among columns) is increased. In this case columns are dominating. W.'s law has been studied quantitatively by Oyama (see references). It is equally well known (from W.'s study) that other unifying and segregating factors act similarly.

O. and Y. introduced another variation, that is successive presentation. They presented successively, with different time intervals (0 - 170 ms), first the I and III column, and then the II and the IV. Obviously a condition favouring the grouping by columns and acting against the grouping by rows, a grouping which is hindered as more, as greater the temporal interval, till it becomes impossible. This factor can be counter balanced, partially, favouring the grouping by rows by means of the factor of nearness, that is increasing the vertical distance.

It is what appears in diagrams of Fig. 2 and 4 concerning Exp. 1 and 2 (which differ only because in Exp. 1 there are luminous dots on dark background, while in Exp. 2 the dots or dark and the background white). There are differences in results of Exp. 1 and 2, but the general trend is the same. (Some interesting differences remain unexplained).

Diagram Fig. 5 concerns the results of Exp. III, where a further condition favourable to the grouping by rows (and therefore counterbalancing the effect of successive presentation (of columns I, III II, IV)). The elements of the first and third row are outline circles on white background, while the elements of the second and fourth row are black dots, as in Exp. II. In this way, not only the factor of proximity but also the factor of similarity favours the grouping by rows. The results (Fig. 5) conform to the natural expectation. The curves, though maintaining the general trend change: the perception of rows prevails also for much greater temporal intervals between the two presentations than in Exp. I and II. The introduction of the factor of similarity has proved its efficacy.

A part from the importance of having quantitative data, results seem to be rather trivial.

But the very interest guiding the research seems to be a special problem: how, why and till which limit is it possible to perceive rows not with standing the regregating action of successive presentation?

The Authors discuss 3 possible explanation.

1. Visual grouping takes place not only among simultaneous elements, but also when elements, although physically not simultaneous, are perceived as simultaneous.

In other words (if I am not misunderstanding the text) rows should be perceived only when, not with standing the physical succession, subjects perceive the elements of the matrix as simultaneous.

A formula is offered, allowing to calculate theoretical curves corresponding to the above hypothesis.

In order to be able to test this hypothesis using the formula each experiment consisted in two parts, in one of which subjects had to report the direction (horizontal or vertical) of perceptual grouping while in the other they had to report if the two parts of the matrix appeared simultaneously or successively (the results of this, part of the experiment appear in the diagram of Fig. 3).

A simple inspection of the diagrams allow one to conclude that the theory does not hold. The Authors are asserting that the theoretical curves give a fairly good approximation for the I, Experiment, but in fact the approximation is very poor for the condition of D_v (Vertical distance of 35 and 40 m) which

should be the most important for testing the theory. For Experiment II and III there is no agreement (as is shown also by statistical tests). Therefore the theory appears to be disproved by facts.

Theories II and III are not necessarily opposite. The III is the most natural one, assuming temporal proximity as one of the factors determining spatial grouping (and should have been the first to be considered); while the II is an attempt to explain in terms of a formal neural model the way where the grouping takes place not with standing the non-simultaneity of stimulation. But the problem should be enlarged by the phenomenon considered by the Authors: also the theory of apparent motion (including fletcher-fusion phenomena) should be considered.

Special remarks

1. (p.1) Wertheimer (op. cit.) considered also temporal proximity, and gave examples of it.
2. (p.2, row 16) "including temporal proximity in simultaneous
3. (p. 2 row 20) The meaning of "grouping" for the A.A. is "grouping between stimuli whose temporal interval is varied from 0 to 170 ms. There is another alternative of grouping (grouping in columns) which is never considered; the consequence is ambiguity and therefore additional difficulty for the reader
4. (p. 2 row 28) "Oyama showed etc.". In fact, it is Wertheimer who showed all these things. Oyama's merit is to have begun to study the facts quantitatively

5. (p. 6, row 28) The percentage of horizontal grouping always increased as D_v increased. "Diagram 2. shows that this assertion is not justified: there are several points where the contrary is true. Of course this is the general trend. But ² as used by the A.A. seems to prove only these existence of a general trend.
6. (p. 12 - Discussion) "perceptual grouping occur even between successively presented stimuli "This is again an ambiguous impression. What A.A. mean is grouping in visual perception between successively presented stimuli. Because in acoustical, tactual and generally in perception extending in time, perceptual grouping between successively presented stimuli is a truism
7. (p. 12) The agreement between obtained and predicted curves (Explanation 1) which have been judged "faily good") becomes "good for the 1st experiment. In fact, as has been stressed before, it is not even fairly.
8. (p. 12) "Perceptual simultaneity may be one of the factors determining the perceptual grouping between successive stimuli". Of course, but this is not an argoument supporting Explanation 1. The fact that a subject does not perceive succession but simultaneity can mean that for this person temperal succession did not act as a conditions against grouping in rows.
9. (p. 14) Faving of traces is not the only possible explanation. Availability of traces can be another explanation (See Köhler, Laneustin, Koffka).
10. (p. 15) The relation with apparent movement cannot be explained away so easily, as more as some subjects reported perception of apparent movement. Consideration of apparent movement theory could be perhaps of some help. (See Karte's Laws and the more recent research in this field.

S U M M A R Y

The object of the preliminary report is the perception of a "jump into depth" that is, actually, of a hole.

The very simple apparatus used for the observations consists in a pierced screen, having at its center a hole of various forms and discussion, and behind it, at a distance of about 45 cm a homogeneous and homogeneously illuminated surface, of different illumination or color.

The following phenomena were observed:

1. Independently of the form, size and color of the screen and the surface behind it, in the above described conditions the observer never perceives a hole, but in its place a surface at the screen level, in the shape of the hole.

A part from the most common case, when the surface behind the hole is not homogeneous but structured, the only exception to the above several result has been observed when, the pierced screen being illuminated, the surface behind is completely of light and appears intensely black. In this case a hole is perceived.

2. If a second pierced screen, with a much greater window is added in front of the previously described apparatus and the first pierced screen and the surface behind, being achromatic reflect a nearly equal quantity of light, so that the vision of the contour becomes uncertain, a mist is perceived spreading into the region between the two pierced screens.

3. A transparent screen, localized at the pierced screen level in the region of the hole is perceived under special conditions.

An attempt is made to explain the above phenomena on the basis of the functions of the contour.

B. To the previously described apparatus a second pierced screen is added, in front of the previous one, at a distance of about 50 cm. The window of the second pierced screen is rectangular and much larger (48x28). The illumination of this screen is indirect and dim. The observer is placed at 3-4 m. from the second screen, so that a wide frame is visible with a circle at its center.

This change of conditions does not seem to exert any appreciable influence on the phenomena described above. But if the intensity of the light reflected from the first pierced screen and from the surface behind the circular hole are varied so as to become very similar, and the vision of the border of the hole becomes uncertain, a mist is perceived which occupies the space between the two pierced screens. Extending the observation, the mist tends to recede.

This effect is obtained with illuminations of different intensity, provided that the light reflected by the screen and by the surface behind the hole are similar. But the effect is more evident with rather intense illumination.

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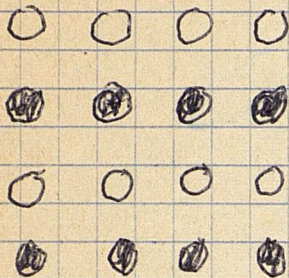
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perceptual grouping between
nonconsecutively presented stimuli

cio' il formarsi
della figura



Gauthier

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Diagram Fig. 5, ~~concerning~~ concerns the results of Exp. III, where a further condition favourable to the grouping by rows (and therefore counterbalancing the effect of successive presentation of columns $I, III \rightarrow II, IV$) ~~is acting~~ ^{is acting} ~~the first and third rows are outlined circles~~ The elements of the first and third rows ~~are outline circles, while the second and fourth rows where~~ ^{are outline circles} circles on white background, ~~black dots, as in Exp. II.~~ While the elements of the second and fourth rows ~~are~~ ^{are} black dots, as in Exp. II. In this way, not only the factor of proximity but also the factor of similarity favours the grouping by rows. The results conform to the (Fig. 5) ~~conform~~ ^{conform} to the natural ~~exp~~ expectation. The curves, though maintaining the general trend, change; rather the perception of rows prevails also for ~~temporal~~ ^{temporal} intervals between the two presentations, much greater

than in Exp. I and II. The introduction of the factor of similarity has proved its efficacy.

Apart from the importance of having quantitative data, results seem to be rather trivial.

But the very interest guiding the research seems to be a special problem: how, why and till which limit is it possible to perceive rows notwithstanding the repelling action of successive presentation?

The Authors ~~are~~ ~~give~~ 3 possible explanations.

3

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OYAMA, TADASU, Japanese studies on the so-call
led geometrical-optical illusions
(Psychologia, 1960, 3, 7-20)

OYAMA, TADASU, Figure-ground dominance as a
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hue, and orientation,
(J. exp. Psychol., 1960, 60, 299-305)

BOYLE D.G., A contribution to the study of
phenomenal causation,
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Ansbacher, H.L.

"Distortion in the perception of real movement"

(J. of exp. Psychol., 1944, 34, pag. 1-23)

Experiments here described are designed to determine certain of the characteristics perceived when a light stimulus is made to rotate through an arc of 36° .

Psychological Abstracts n. 1979, vol.XVIII-1944

Ansbacher H.

"Further investigation of the Harold C. Brown shrinkage phenomenon; a new approach to the study of the perception of movement"

(Psychol. Bulletin, 1938, 35, pag. 701)

Psychological Abstracts n. 1230, vol.13, 1939

Psychological Research

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28.9.77

Re: T. Oyama, "Perceptual Grouping between Successively Presented
Stimuli and Its Relations to Visual Simultaneity and Masking"
A. Landauer, "Subjective Figures and Prägnanz"

Dear Professor Metelli,

I am enclosing another Ms. with a request for review for Psychological Research, even though I just sent you another one, because Oyama and Yamada's work is like the Landauer Ms. which you now have, "right up your alley", as we say. I hope that this will not be too burdensome.

I would appreciate having your comments on the Landauer Ms. fairly shortly, and on the Oyama Ms. by November 1, if possible.

Best regards,

Freeman
R. B. Freeman, Jr.

① 1. chiarezza - verdeave indicati

2. Problema ovvio - buona tecnica di esperimento

3. supposti: I ovvio, espp. non ovvio soltanto per
II vedere bibbia Sperling 60 Haber & Horvath 1973
informazioni contemporanee ma anche per
III factor of proximity effective in temporal as well
as spatial dimensions

ovvio, subra. Canning non è il metodo
per studiare

probab. of grouping between successive stimuli will
decrease as the temporal interval increases.

time range of grouping determined by relative stimu-
lant strengths of various factors of grouping

quando i fattori (di W) sono più forti fra gli elem.
presentati contemporaneamente, il raggruppamento fra
ovvio e non chiaro { tali elementi avviene per una scansione di tempo
massima. ~~Altrimenti~~ Quando sono più forti
i legami fra stimoli contemporanei la scansione
varia meno

p. u. h. La varia soltanto la forza dei fattori
che legano gli elem. contemporanei mantenendo
fissi il tempo di successione, cose diverse?
Hanno effetto uguali? Ma anche se non
tutti contemporanei!

o o o o

Ogama Perceptual grouping as a function of proximity
Psych. Monographs 13 305-306 (1961)

Sperling Psych. Monograph 74 (1960) Richard W. Hart
Haber & Horvath - The Psychology of Visual Perception Holt etc 1973