T. OYAMA and W. YAMADA

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

It is an interesting research which deserves to be published. It 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 0. and Y. appears at first trivial. A matrix of 4x4 elements (or better sub-mists) 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 dislance among elements), rows are more and more dominating, as favoured by the factor of nearness. The contrary happens if the horizon-tal 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 in 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 prooved 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) tows 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 theorical 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 $D_{_{\mathbf{V}}}$ (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 en larged by the phenomenly considered by the Authors: also the theory of apparent motion (including fleither-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. Oyamas 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 "favily 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.

SUMMARY

The object of the preliminary report is the perception of a "jump into de th" 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 screems.

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. 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. 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.

cioe 9

2 copie 1. Oyama and W. Yamada Correptual grouping between macessively presented Stionality and und simultaneity and masking It is an interesting research which deserves to be published. It main merit is to have studied greantitate vely, with rigorous method, and with new variations, a wellbe shared also from reflerent points of riew. its main defect is the lack of vireet Rnawledge of fundamental but not runt bibliography. The problem is not very clearly dated. Verreplush grow pur between ruccessively presented thinulo has been studied and veneoustrated abreaty in the classical paper of Wortleiner (see references) and is by no means. new, But what the Authors have sturied is The influ ence of a comporal interval on spatial grouping. at first trivial. Amatrix of 4 x4 clearing (or better interints) may be mainly perceived as 4 rows or 4 columns. If conthan conditions are expal analternation of these two structures as is generally perceived. The distance among rows is increased (is tried resource among elements), rang are increased (is tried resourced, as favorized by the factor more and more dominating, as favorized by the factor of planness. The contrary happens if the horizontal ritariole (is take among columns) is increased. The tritary case ce (is take among columns) is increased. The third case columns or dominating (escathiums). W. law has columns or dominating (escathiums). W. law has been studied grantitatively by Oyama (see references), It is equally well Knawn (Stron W. stroly) That other unifying and signegating factors act strictory. O'ant Y' introduced another variation & Wat is ruccers we presentation. They presented successively, with offerent time intorvals (0-170 ms), first the I and in column and then the II and the IV. Obvious. gly a condition atting favouring the grouping by columns

which is himsered as more, as greater the temporal inter vol, till it becomes impossible. This factor con be counter balanced, fartially, favouring the grouping by rows by means of the face for of nearmers, that is increasing the vertical villance forting this what appears in fragrams of Fig. 2 and 4 thereone to the concerning and 2 (4 hich differently because in Ext I Neve on luminous look pour background, while in Exp. 2 The volt or vork and the background but white). There are influences in resolly of Exp. 1 and 2, but the graval brend is the same. (Somethy forthers respecially remains plained). (Some interesting differences remain mick plained) Diagram Fig. 5 + concerning concerns the results of Exp. III, where a further contition favourable to the grouping by 20005 (and Therefore counterbalon cing the effect of meeessine fresholding of columns I, III > II, W) XI to the total to first and third rows one outline circles The elements of the first and third rows where are outline circles, while the month and purth nows where Core black sots, as in the p. 11. In this wong, not only the fee tor of proximity but also the factor of similarity favours The grouping by rows. The results conform to the (FJE) conform to the natural expertation. The curves, Though mantaining the general trend change; rather the perception of rows prevails also for temporal intervals between the two presentations, than in Exp. Tand II. The in brownellous of the tactor of similarity has prooved its efficate. Apart from the importance of harring grantilative rata, results reem to be rother trivial. But The very wherest guiding the research reems to be a special problem: how, why and till which himit is it possible to perceive rows notwithstanding the representation?

The Authors are virun 3 possible explanations. 1. Visual grouping two talkes place when elements, at Hough phyrically not simulta not only among simulta neous clements, but also when clevets, although physic Cally not nivultaneous, are perceiver as simultaneous. coversons in to this helpo hypothesis.
In other words (4) and not misunderstanding the lest) rows. should be perceived only when, notwith claiming the physical mererion, a both subjects pireine the clements of the motrix as rimultaneous. A formula is affered, allowing to calculate theorical curves corresponding to the above hypotheris. each experiment consister in two parts, in one of which subjects Last to report the virection (horistortal or vortical) of perceptual grouping, in the other while in the other Ney had to report I the two parts of the matrix affeored nurellaneously or meerively (Fig. this part of the experient (The results of this part of the experiment appear in The riagram of tip 3). A simple inspection of the tragrams allow one to conclude that the Theory does not hold. The Anthors are overting that the theoretical tacurous give a fairly food approximation for the 1 Experiment, but in fact the approximation is very poor for the condition of De (Vertical ristance) of 35 and 40 mm which should be the most important for terting the theory. For Experiment II and in Place is no agreement (as is shown also by totaled tests). Therefore Theories II and in are not necessarily opposite. The III of the factors returning Matial promping faint should have been the first to be considered; while the treats one it is an attempt to explain, in terms of a formal neural motel of the Housing the non-simultancity of thinulation. But the problem should be enlarged bryond the subscripting countered but the Anthors: also the thether of offerent wation (including thicker) with theory of afforest wation (including thicker) with the problem.

formal newal provet To estere Ce più importanti. Le leonie " ell non sono us conbicepfosition. La 111 de e quella ety n'offre naturalmento (d'intervallo temps vale è una selle tonto los rejionis à reffrent amente), mentre la a vovsielbe essere la primpar essere preisa in conhereron, mentige la té d'un époter un bel sillen hervoso, refuori in en agine da el raj cruppamento malgrado la municipio la la non-contem posamesta della strustatione, Mes in gherto caro/d problema andubbe allargate on considerage and i from to flicker fusion of lateral of moviment apparents - che in effets seen per cepito de almi roppito flegi di Morte e musi vo your for 1. Special remarks attration portieotori (1.1) Wertheimer (of cit) considered also temporal proximily and examples of it. 2. (p. 2, row 16) "induding temporal proximity in Jinullancons 3. (p. 2, ran 20) The meaning of "grouping" for the Ad is "pron my between stimuli whose temporal interval is varied from
o to 170 ms. Thore is another alternature of prouping
(grouping in columns) which is never considered. The from
secretarity and therefore and hoursel difficult
by for the reader 4. [p. 2 now 28] Ogama horocot etr. In fact, it is West Leines who showed all these things. Oyomas weret is to have begun to trudy The faith quantitatively 5, (p.6, row 28) The percentage of horizontal grouping al Ways mercased as Dr increased. I agrow 2 Would that Wistarrer lion is not pertiped: There are several points a hore We contrary is true. Of convise this is the general trend. But x2 as used by the AA. The many provenably this existence of a several trend.

6. (p.12 -) runion) "perceptual grouping occur even between necessively presented stimuli" This is again an aprenion. from we to What A. A. nean is perceptical grouping in virual perception between meenvely presented time to Because in aconstical, tacteral and in querally perception extensing in time, perceptual grouping between mecessively persented timeth is a benism. 71 The agreement is between obtained and presented curves (Exploration 1) which has been judged "fairly good" lecomes "good" of for the 1st experiment. In fact, as has been stressed before, it is not estimated forthy food. It remains to be explained why there is agreement for rome of the ileations of exp. 1 8 (1-12) "Perceptual simultancity may be one of the for ton velorium the perceptual grouping between meets rive stimuli," Of course, but this is not an argument not perceive succession but simultaneity can means that for this person temperal mucission was a compliant grouping in rows. 9. Faring of traces is not thought possible explanation. Franka Ava Prailability of traces con be another explanation, (See Kaffla Kähler Lauburtin , Kallha). 10, 15 The relation with apparent movement cannot be explorient away to early, as nore as some subjects re portet perception of apparent movement. Consideration of apparent movement theory could be perhaps of some left, ("see Horle's Laws and the wore recent research in this field."

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

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

BOYLE D.G., A contribution to the study of phenomenal causation,
Quaterly J. exp. Psych., 1960, 12,171-179

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 per ceived 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

An International Journal of Perception, Learning and Communication Founded as Psychologische Forschung

Professor R. B. Freeman, Jr., Universität Konstanz, Postfach 7733, D-7750 Konstanz

Prof. Dr. Fabio Metelli
Istitituto di Psicologia
Sperimentale dell'
Universita di Padova
Piazza Capitaniato, 5
I - 35100 P A D O V A
Italien

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 <u>Psychological</u> <u>Research</u>, 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,

relwa. B. Freeman. Jr.

1. chiarerra - verresove intreats 2. Problema ovris - buona leenco N'entagrace 3 Mujamoni : Torray raff. non arrive to that from
I verere behape Sprely 60 theber efformation 1923

Il pactor of proximity effective in temporal or well
as special remembers per studiarle Comme en non i El melad trobate of prouping between necessite itement well recreases. Time range of grouping relevement by celative retal tout viengther of various factors of chupin quando i fallores di w som pui forti fra si elev. resulate neembount, il eaffrupper fra laufo Tali climenti arvivea see per una famou à tompo massion. Heontrarte Chanto son fin forir i lefour fra thinoti continporaner la form non sovia minore chiar f. ci. h. L' varia soltante la forta rei fattor che ligar pl'elem contimporante montiment from it temp i nicerrain, core evering. Ham effetto ugregante? ma anche 21 to Tuth' contingorances. 0 0 0 or many a service ! 1 1 Dyama Perceptual grouping as a function of profirm by Porce wot. 1 Kells 13 305 306 (1961) Sperling, Pr. monoproph 74 (1960) Ruebortelleston Haber c Herreuson - The Popelwhory of virial ferreth Holtete 1873