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VIRTUAL LINES AND PHENOMENAL MARGINS IN THE ABSENCE OF STIMULATION DISCONTINUITIES

LINES AND MARGINS: «REAL» AND «VIRTUAL».

A line can be exactly defined as the geometric entity constituted by spatial positions occupied in succession by a moving point.

However, such a definition does not capture the rich qualitative variety that from a phenomenological viewpoint is displayed by lines that are experienced as immediate perceptual data of our visual field and among which we normally draw a spontaneous distinction without difficulty.

For instance there is an important perceptual difference between *simple lines* and *margins*.

As regards its perceptual appearance, a margin is the border of a chromatically homogeneous surface or the separation line between two qualitatively different surfaces.

The unidimensional structures of the visual field that cross or segment surfaces are experienced instead as simple lines.

It can be shown that the main condition of the phenomenal existence of such elements in the visual field is constituted – as a rule – by a certain type of qualitative or quantitative discontinuity of stimulation.

In other terms, within visual experience a line or a margin normally correspond to an abrupt step in the intensity or wavelength of radiations impinging on a given retinal area.

However, such a correspondence does not always occur and, therefore, is not sufficient to explain the problem of the formation of visual lines completely.

As a matter of fact some lines – so-called *virtual lines* – form themselves within fields stimulated in a wholly homogeneous way.

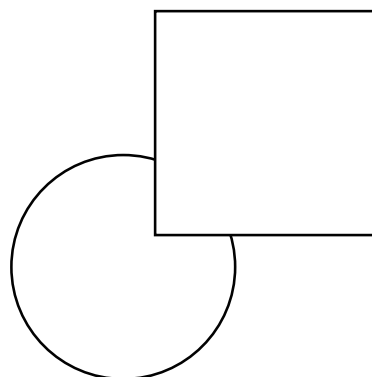


Fig. 1

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This happens, for instance, anytime a given set of dots spontaneously organizes itself as a figural pattern with a well defined structure. In such a case the linear connections that perceptually emerge between points cannot be referred to some inhomogeneity of stimulation, but are nevertheless characterized, differently from lines only *thought* or *imagined*, by the possession of a particular phenomenal «presence».

In fact, among the seven points arranged as the stars of the Big Dipper innumerable linear connections are “thinkable”. However, they are devoid of the coerciveness with which linking lines familiar to any watcher of the starry skies impose themselves.

The actual tracing of lines connecting such points merely makes more evident the linear links that, as a matter of fact, already possess a real perceptual existence unshared by other geometrically possible and, as such, only imagined lines.

Also the “invisible presence” of lines of a figure that completes itself “behind” another, like the circle in fig. 1, belongs to the very same category of phenomena.

Margins too, as well as simple lines, can exist only “virtually”, being experienced – in other terms – as limits or borders of a surface objectively identical in all respects to neighbouring zones, with which it actually constitutes a field correspondent to a perfectly homogeneous stimulation, without qualitative or intensity steps.

The phenomenal scission occurring in such circumstances (see fig. 2) is strongly enhanced if the movement factor is introduced, like in stratification phenomena studied by *Metelli* or in the screen effect and tunnel effect by *Michotte*.

QUASI-PERCEPTUAL MARGINS.

The degree of perceptual evidence of virtual lines can be enhanced so to obtain – between the two extremes constituted by merely imagined lines on one side and those truly perceived, produced by a stimulation step on the other – a further intermediate stage of phenomenal lines in fields with homogeneous stimulation.

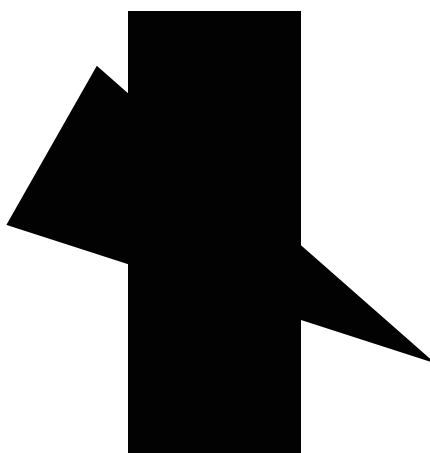


Fig. 2

The phenomenon, already signaled by *Schumann, Matthaei, Ehrenstein*, is particularly evident in the situation illustrated in fig. 3.

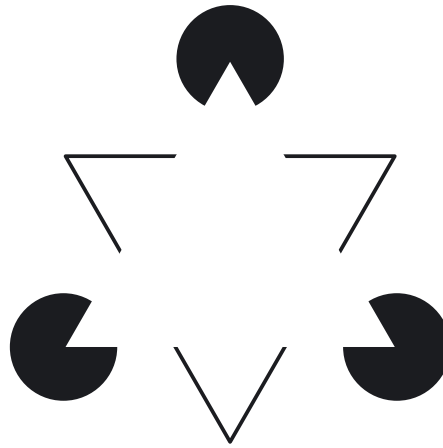


Fig. 3

Objectively, this is constituted by three black circular sectors and three broken lines arranged in a certain order on a completely uniform white background. Instead, the impression one obtains from it is normally that of a white triangle partially covering another triangle with a black outline only and three black disks. This is much brighter than the background, is situated “in front” of other parts of the field, and possesses its own margins that some observers can mistake as the true borders of a surface really detached from the background.

The analysis of situations that give rise to stratification phenomena, as the one occurring in fig. 3, and to the consequent appearance of quasi-perceptual margins, allows us to ascertain a condition that is common to all. This is represented by the presence of figural elements that can easily reach a higher stability and *Prägnanz* through a process of *completion*.

In fact, the *three* angles of fig. 3 have a strong tendency to unify themselves in *one* equilateral triangle that constitutes a form, non only unitary, ma also much “better” as to simplicity and balance, whereas the three circular sectors acquire regularity and *Prägnanz* if they complete themselves into three disks.

But the condition for the occurrence of such formal improvement is the experiencing of the white central zone as a triangle, “behind” which the other elements complete themselves into disks and into triangle. As a consequence the triangle, localized on a different plane, does not anymore “belong” to the white background, from which it appears divided by a sharp edge that constitutes its border.

However, the completion can have an amodal character only, happen “behind” a non transparent surface, therefore at the expense of the unitarity of the white surface that – as a consequence – must split itself, along defined lines of separation imposed by given figural conditions, into layers localized on different planes.

Therefore, the tendency to completion should be considered the primary and necessary factor determining the formation of margins with quasi-perceptual character in the absence of stimulation discontinuities.

If this statement is correct, it should be possible to demonstrate that, other things being equal, the phenomenon does not occur when *completion* is missing.

To this goal it seems to me that a rather convincing proof can be represented by the following example.

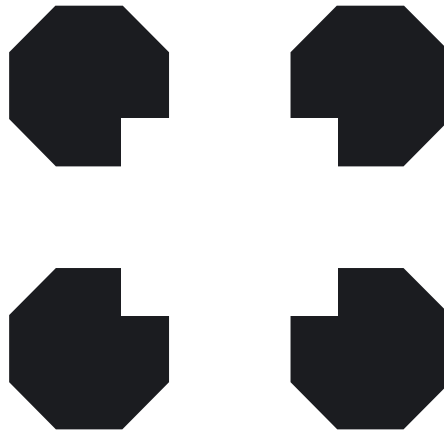


Fig. 4

Let us observe the different perceptual outcomes of figs. 4 and 5. As a rule a stratified organization imposes itself in the first: a white non transparent rectangle partially covering four black regular octagons; simply four crosses in a white field are obtained in the second. In this case the background is unitary and does not present “scissions”. Actually, virtual lines can make their appearance, delimiting a white central rectangle, but they never assume the quasi-perceptual character of margins of the corresponding rectangle of fig. 4.

The reason of the difference is evident and must consist in the different figural character of the black elements in the two patterns. The crosses are by themselves good, balanced, closed forms and do not need to complete themselves to improve: hence, the internal angular margins belong to them and not to the background that continues, without its own contours, under the figures. Instead, the black forms of the parallel configuration are “open”, “incomplete”; only if they are experienced as regular octagons they acquire, through such a “closure”, a higher degree of stability and compactness. In this case the internal angular margins do not belong to black figures, but to a white figure that, being situated “in front” of octagons, must detach itself from the background, from which it appears divided by its own margins.

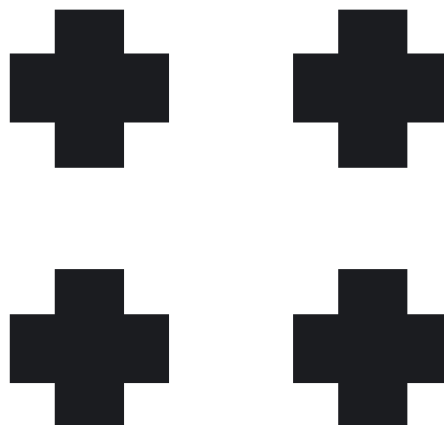


Fig. 5

To conclude, it seems to me one can claim that, in the situations that have formed the object of the present investigation, some incomplete figures “improve themselves” through completion: such completion is amodal and therefore realizes itself *behind* a non transparent surface that in such a way happens to be localized on a plane different from the background to which it should belong and is perfectly identical as far as stimulation conditions are concerned.

But a surface cannot exist without margins: from here the necessity of the scission of the homogeneously stimulated zone and the appearing of quasi-perceptual margins.