Prägnanz and its Discontents

Rudolf Arnheim

By a welcome coincidence, both Gaetano KANIZSA and I have recently felt the need to clarify the meaning of the term *Prägnanz,* which has come to be referred to as a kay aspect of gestalt psychology without, however, being unambiguously defined (KANIZSA and LUCCIO 1985; ARNHEIM 1986). Since we worked independently and were led to quite different considerations, the following comments may be of some use.

I shall not be concerned here with the historical question of how the term *Prägnanz* was used by the founding fathers of gestalt psychology or whether their use of the term fits the perceptual facts as we know them. What concerns me is which concepts we need nowadays to account for the phenomena of visual organization and, secondarily, which technical terms might fit those concepts best. To avoid confusion, I shall refrain from using the term *Prägnanz* until the concepts are clarified.

To begin with, among the innumerable shapes populating the visual world there are some privileged ones that embody basic perceptual qualities with optimal purity. Qualities such as symmetry, circularity, squareness, parallelism, or orthogonality are distinguished from shapes that are less clear-cut, more complex, or ambiguous. GOLDMEIER (1972, p. 73) has asserted that those pure cases are what is traditionally referred to in gestalt psychology by the German word *prägnant* and has proposed to translate it into English with the word *singular* because a quality such as, for example, orthogonality exists only once in the set of all possible angles. KANIZSA adopts this term, *singularità,* for his Italian text, whereas I consider the choice misleading. Things can be unique, that is "singular," for many reasons totally unrelated to the phenomenon we are interested in here. Singularity is only a secondary consequence of the purity distinguishing the shapes under discussion. What matters is not that we are dealing with singular things but that we are dealing with "embodiments of pure shapes."

KANIZSA is certainly correct in saying that not all visual gestalten meet this condition. In fact, very few do. (Even the term "good gestalten" is better not limited to this particular meaning, as I shall assert later.) Let me turn now to another basic phenomenon, which does apply invariably to all gestalten, namely the tendency to simplest structure, also known as the principle of economy or minimal tension. Here we have a law of nature, an whose universal validity in the physical and psychological world there seems to be no disagreement. Like all other laws of nature this one does not predict the resulting situation in any particular case. The law of gravity by itself, for instance, does not predict whether a given object in a given situation will fly or drop to the ground. Similarly the gestalt law under discussion indicates only that "when field conditions predominante, a structure will

assume the simplest organization available under the given citcuw stances."

By no means does this simplicity principle indicate that, alwayl: **or typically, the process will** result in the creation of the kind **of "pure shape" mentioned above.** Only very special conditions **bring that about. When the simplicity** principle is given suffi- **ciently free play, it will indeed** produce shapes as simple as a **perfect sphere or a symmetrical pattern.** Although rarely brought **about in practice, those pure shapes** are, however, the ideal **realizations of what the simplicity principle** strives for. (Com⁻ **pare my references to pertinent physical experiments** [1979, p. **14].) We find that there does exist a close** relation between the **simplicity principle and "pure shapes," even** though, as KANIZSA **insists, a distinciton can be made between the** conditions that **bring about a given percept** *(funzione esplicativa)* **and** the way the **percept appears to the** *eye (funzione descrittiva).* After all, **seeing a pattern also involves an action of the simplicity principle, and therefore what is explained and what is** described have **recourse to the same gestalt law.**

Another distinction proposed by KANIZSA, although certainly correct and quite important in itself, also does not seem to me truly relevant to the matter at hand. He points out that when under conditions of subdued stimulation observers report "seeing" patterns which approach "pure shapes," they often do not actually perceive those shapes but merely resort to visual categories stored in memory. Here again, what matters for our present argument is that the power of "canonical" shapes in the inventory of memory images testifies to the universal effectiveness of the tendency to simplest shape, be it in strict perception or at a **higher cognitive level.**

I *do* **object, however, to KANIZSA's unwillingness to admit that dynamic tensions are a genuine aspect of perception. He is inclined to doubt their presence even when they create measurable modifications of the stimulus pattern, as happens in optical illusions. After all, he says, these tendencies "have no other manifestations than that restlessness or subjective sense of tension - they never have any consequence at the level of phenomenal reality" (p. 36). Here it seins to me essential to insist that the tensions inherent in visual patterns are every bit as perceptually real as, say, the kinesthetic sensations pervading our bodies, even though up to now we cannot record their physiological counterpart in the nervous system. What pulls the little gray square in Fig. 1 (KANIZSA & LUCCIO, Fig. 34) back and forth between the incomplete square and the cross is not a matter of the**

Fig. 1 Abbildung 34 in KANIZSA & LUCCIO (1986)

observer's preference but a strictly perceptual feature inherent
in what is generated by the stimulus situation and actually per-
ceived. We may be able to "prove" its existence only by recourse
to what observers experience, but that does not keep it from
being phenomenally real.

KANIZSA offers useful examples to show that when there is
perceptual competition between the structure advocated by the
more global components of a pattern and local factors such as
"good continuation," it is not always the former that wins out.
Quite likely, in the early days of gestalt psychology its
proclaimers were inclined, for strategical reasons, to overstress
the influence of the whole upon the parts. Actually, as I have
pointed out elsewhere (1977, p. 202), the opposition of whole vs.
parts is a conceptual simplification that does not do justice to
the complex interaction taking place in a gestalt context. What
we do find typically is a hierarchy of structural levels, some
more comprehensive, some more local, each governed by the
simplicity principle. Which level prevails over the others
depends on their relative perceptual power. In some cases, as in
those illustrated by WERTHEIMER in his Figures 14-17 (1923, p.
323), the more global features win out over the more local ones;
in others the opposite is the case. Either outcome is perfectly
in keeping with the basic definition of a gestalt, which should
indicate nothing more than that under field conditions the
resulting organization will be determined by the interaction of
the forces operating at the various structural levels.

When one properly focuses on what happens in a perceptual struc-
ture as a whole, one cannot expect that the tendency to create or
maintain the simplest shape will apply to any particular subwhole
in isolation from its place and function in the total pattern.
The opposite may be required by the gestalt law. Thus in the very
instructive Figure 2 (KANIZSA & LUCCIO, Fig. 32) a rectangular
stimulus is forced to give up its "canonical" regularity in
response to a deformation of the total field. The divergence of
the parallels, which constitute the ground level of the pattern,
creates perceptually an inhomogeneous non-Euclidean space, which
upsets the state of equilibrium by its onesided expansion. The
tendency to tension reduction is strong enough to deform the
rectangle in the opposite direction, thereby compensating the
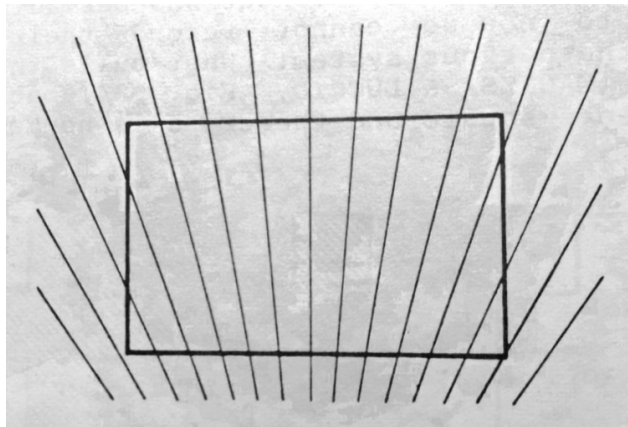

Fig. 2 Abbildung 32
aus KANIZSA &
LUCCIO (1986)

unbalance of the whole pattern to some extent. Far from refuting
gestalt prediction, the deformation of the rectangle is in keeping
with the tendency to simplest structure.

As the preceding discussion will have made clear, the shapes
emerging from gestalt organization cannot be expected to be always
the "pure cases," as I have called them. Nevertheless those simple
shapes exert a powerful indirect influence, especially in the
penumbra zone of shapes that are perceived as approximations of
the pure cases. In the visual arts, for example, pure shapes like
triangles, spheres, symmetrical or parallel shapes are frequent
only in architecture. In painting and sculpture they are much more
often seen as the underlying "bone structure" of the actually
given shapes. The famous triangular compositions of some Renais-
sance artists display no strict triangles. Rather they are confi-
gurations of shapes through which triangularity transpires visual-
ly and which derive their compositional power from it (Fig. 3).

Fig. 3 Abbildung 13 aus ARNHEIM (1973)

Similarly, for example, the transparency effect in Figure 4
(KANIZSA & LUCCIO, Fig. 10) comes about through the structural
coherence of the grey pattern, which profits sufficiently from
rectangularity, even though it has the outlines of a sloppy towel.
Contrary to KANIZSA's interpretation of the figure, the structural
improvement obtained through the pulling together of the eight
units into just two surfaces, a gray one and a black one, is very
substantial.

Thus far, I have needed only two concepts to describe gestalt
processes, namely the tendency to simplest structure and the pure
shapes. But there is need for a third term to describe a further
aspect of gestalt organization, and here the word *Prägnanz* in the
German sense of clear-cut, economical, pithy, or terse fits per-
fectly. I have pointed out elsewhere (1978, p. 411); 1986) that
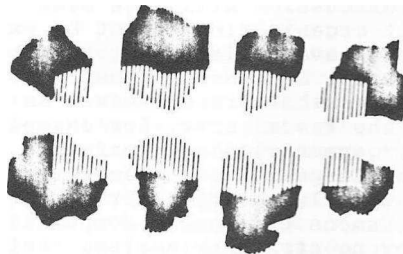the simplicity principle alone does not suffice to account for

Fig. 4 Abbildung 10 aus KANIZSA & LUCCIO (1986)

perceptual organization. Left to its own devices, it would dis-
solve all visual material into complete homogeneity, which is
obviously the maximum simplicity available. A counterforce, which
I have described as an "anabolic tendency" (1979), is needed to
represent the shapes to be perceived. In ordinary perception the
stimuli projected upon the retinae create this counterforce, whose
input is then subjected to the organizing power of the simplicity
tendency. This tendency exerts is influence within the limits
imposed upon is by the stimulus. Similarly, in the composition of
a work of art the intended theme or subject is moulded by the
simplicity tendency into the optimal shape of the artistic state-
ment - a composition pared to its essentials, clear-cut, and unam-
biguous. Such images, formed by the action of the two antagonistic
forces, do indeed deserve the term *prägnant* in the original sense
of the term. They also deserve the laudatory name of "good gestal-
ten" because their precision and clarity are of high biological
and cognitive value. By no means can these images be expected to
be simple. On the contrary, outside the laboratory of the psycho-
logists they are almost always very complex. But they conform to
the predictions of gestalt theory by being as simple as the cir-
cumstances permit.

Summary

As a comment an *La pregnanza e le sue ambiguità* by G. KANIZSA and R.
LUCCIO, the present paper asserts that three basic concepts are
needed to describe perceptual organization in gestalt terms. *"Pure
shapes"* are simple geometrical patterns brought about under the
influence of the *"Tendency to simplest structure,"* but only when
special conditions prevail. More commonly, gestalten are quite
complex. The third term, *"Prägnanz,"* not to be confused with the
other two, ought to be reserved for the result of the interaction
between the anabolic stimulus or theme of the percept and the
simplicity tendency, creating the most clear-cut, stable, and
econimical, although often quite complex structure.

Zusammenfassung

Mit Hinweis auf den Aufsatz von KANIZSA und LUCCIO wird dargelegt, daß   drei verschiedene Begriffe notwendig sind, um eine Wahrnehmungsstruktur gestalttheoretisch zu beschreiben.
(1) *Reine Formen* sind geometrisch einfache Figuren, die unter dem Einflug der (2) *Tendenz zur einfachsten Struktur* zustandekommen können; dies aber nur unter bestimmten Bedingungen, da Gestalten im allgemeinen recht vielfältig sind. Der Begriff (3) *Prägnanz ist* mit den beiden anderen nicht zu verwechseln. Er sollte sich ausschließlich auf die Wechselwirkungen zwischen der Einfachheitstendenz und dem "anabolischen" Reiz oder Thema einer Wahrnehmung beziehen und zwar auf die jeweils klarste, stabilste und sparsamste Fassung dieses Zusammenspiels, die aber sehr komplex sein kann.

References

ARNHEIM, R. (1977) Zur Psychologie der Kunst. Köln: Kiepenheuer & Witsch.
ARNHEIM, R. (1978) Kunst und Sehen. Eine Psychologie des schöpferischen Auges. Berlin: de Gruyter.
ARNHEIM, R. (1979) Entropie und Kunst. Ein Versuch über Ordnung und Unordnung. Köln: Dumont.
ARNHEIM, R. (1986) The two faces of gestalt psychology. American Psychologist, *41,* 820-824.
GOLDMEIER, E. (1972) Singularity in visually perceived forms. Psychological Issues, *8,* 1-135.
KANIZSA, G., LUCCIO, R. (1986) Die Doppeldeutigkeiten der Prägnanz. Gestalt Theory, *8,* 99-135.
WERTHEIMER, M. (1923) Untersuchungen zur Lehre von der Gestalt II. Psychologische Forschung, *4,* 301-350.

Anschrift des Verfassers:

Rudolf Arnheim
Ann Arbor,
Mich. U S A