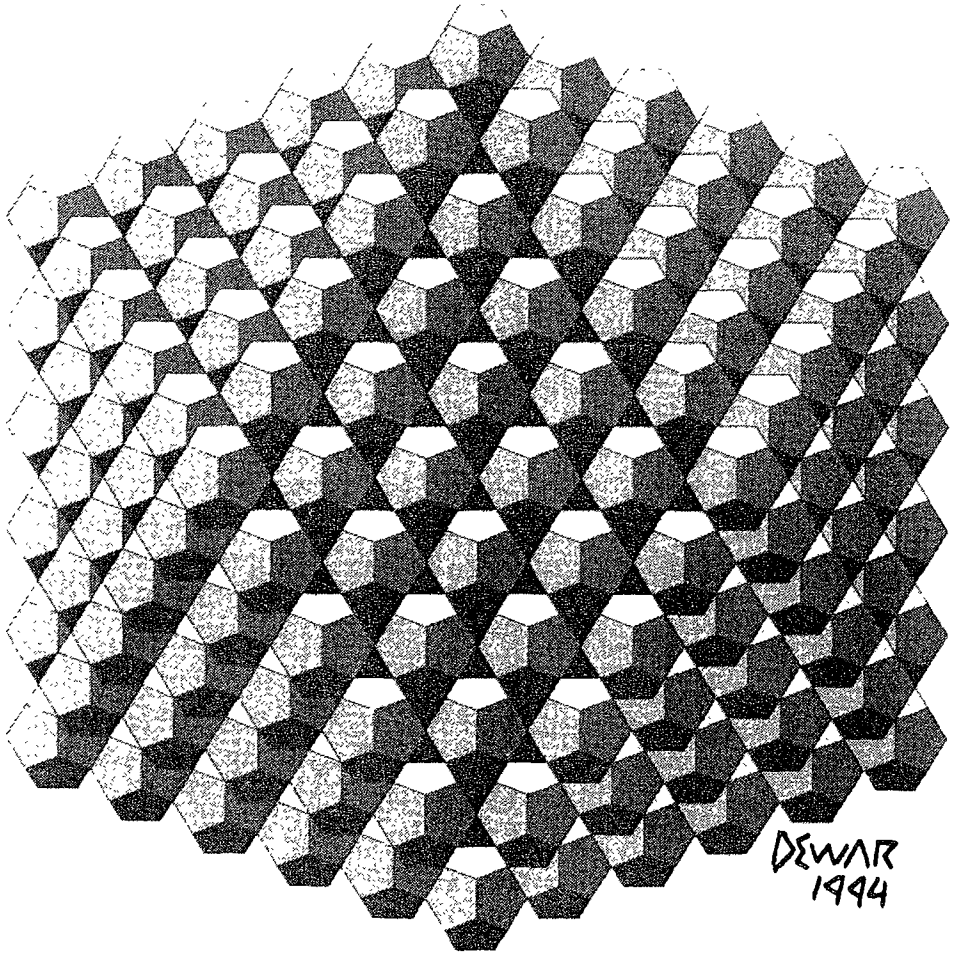
Symmetry: Culture and Science

Symmetry:
Natural and Artificial, 2

The Quarterly of the
International Society for the
Interdisciplinary Study of Symmetry
(ISIS-Symmetry)

Editors:
György Darvas and Dénes Nagy

Volume 6, Number 2, 1995



Third Interdisciplinary Symmetry Congress and Exhibition
Washington, D.C., U.S.A. August 14 - 20, 1995

"PERCEPTION" = CONGRUENCE

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Traditionally, "perception" most dominantly was, and still seems to be, regarded *either* as an activity or achievement of individual organisms, or rather *minds*, which, somehow endowed with "memory" and "volition", would "intentionally look for something" (Helmholtz 1866), *or*, with a more materialistic inclination, it is simply viewed as an organic process - where the once influential hypothesis of "Gestalt theory", that perception were the result of an autochthonous self-organization of the *brain* - to which "subjective experience" happens to be isomorphic (Köhler 1920) - seems to regain some popularity (→ Haken & Stadler 1990). The trouble with the aforementioned approaches to perception, as I see it, is that they have to presuppose what they attempt to explain: how could anybody know anything about perception, if all of her or his perceiving, in turn, was always influenced by some previous perceptual activity, or was the result of autochthonous self-organization anyway? Both Helmholtz' empiricism and Köhler's nativism appear self-defeating.

Luckily, an alternative seems to be available: evolutionary biology, or, rather, its descendants - ethology as propagated by Lorenz (1941), and ecological psychology as formulated by Gibson (1966; 1979) - suggest a "mutuality of perceiving animal and perceived environment" - an "advance fit", as it were - which seems to escape the circularity just sketched. However, it would appear to be quite difficult, if not wholly impossible, to judge evolutionary fittingness unless the species, whose perceptual abilities are being investigated, became extinct. Hence, a less restrictive standard by which to evaluate animal-environment fit would be welcome.

Euclidian geometry offers the concept of *congruence*. Curiously enough, this notion, despite many attempts to provide an axiomatic foundation for it (e.g., Hilbert 1889; Veblen 1904; Huntington 1913), appears to be - and forever remain - *perception-based* (Pasch 1882). In fact, Gibson (1979) (re-)discovered *optical occlusion* as the most fundamental information for perceiving "depth" (cf. Euclid, *Optics*, §§ 15 to 17), thus at first establishing the very possibility of congruence by providing a means to discriminate that which will be so related - which means is optical "accretion" and "deletion" of surface texture.

We have to be careful at this point, however, not to confuse mathematical reasoning, which aims at unequivocal conclusions given certain premisses, and everyday "perception-action coordination". What matters to living organisms seems to be "liberalized", approximate congruence only. For example, if someone was said to "perceive" - or perhaps misperceive! - some cylindrical "form" to be the handle of a *door*, what matters is whether he or she can *grasp* it, i.e., whether the palm of his or her hand can be brought into proper contact with the handle's surface so that the door could be opened (Gibson 1979 would call this the perception or misperception of an "*affordance*"). - More complex congruence relations or symmetries have to be attended to for the control of stance and locomotion (Gibson ibid.).

The trouble with Gibson's (1966; 1979) approach to perception again appears to be a certain circularity in the course of the argument. Discrimination of surface texture or observation of optical occlusion seem to presuppose some "perceiver" as well as "something perceivable". Thence, the more radical thesis of "perception = congruence" to be advanced here is to regard "perception" not as an "activity" or "process" at all, rather, a relation of logical modalities only (Ockham [→ Boehner 1957]; Ryle 1949; Wittgenstein 1953). The ultimate basis for such kind of an ontologicly neutral, purely terminological system I find in the

notion of "*adjacency*" ["*neben einander*"] (Kant 1781; Helmholtz 1879)[1], and its inherent self-relatedness, which constitutes at once an "extendedness", a "difference" (a "numerical" one at least), a "border", "relativity", "congruence", and maybe more (Landwehr 1995)[2].

Given this, what - eventually - could it mean to "*perceive symmetry*"? Early researchers, e.g. Bahnsen (1928), seem to have assumed that symmetry, "objectively", i.e. as defined by the investigator, should necessitate certain "effects" on the part of naive subjects (inter alia, it was found that the symmetric parts of a "frieze pattern"[3] would preferrably be seen as "figure", rather than "ground"). Others (e.g., Barlow & Reeves 1979; Zimmer 1984) have tried to answer the - apparently - logically prior question, whether subjects would actually notice the symmetries built into certain displays (it turned out that people were able to discriminate "perfect" from "degraded" mirror symmetry in "random dot displays" and isolated "figures" - where Barlow & Reeves served as their own subjects!).

My own way of thinking about "detectability", possible "perceptual effects" or, rather, *possible self-relations* of symmetry, is guided by the supposition that - optically and logically - symmetry seems parasitic upon *visible surface texture* (Gibson 1950). Natural textures, e.g. those of the different species of *wood*, most often seem to exhibit a bewildering complexity of both orderliness and irregularity. The same seems to hold for certain artificially - if "artistically" - produced textures. My suggestion now is - it might in fact be regarded as an, albeit vague, analogue to the well-known Fourier analysis - that, however complex, any

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[1] The notion of "adjacency" to me appears to be unique in that it seems to presuppose itself by its very definition. Kant's (1781) and Helmholtz' (1879) second a priori notion, "*succession*", or rather "*simultaneity*" ["*nach einander*", or: "*Gleichzeitigkeit*"], can be shown to be parasitic upon "adjacency" (Landwehr 1995).

[2] A copy of the complete terminological system is available from the author.

[3] Symmetry groups *p1a1* and *pma2*, respectively (not then known by Bahnsen).

texture can be decomposed into a sum of overlaid regular "tilings" and "patterns", and, conversely, any texture, however complex, can be synthesized by overlaying certain regular tilings and patterns (where "patterns" may be regarded as parasitic upon "tilings"; cf. Grünbaum & Shephard 1987; Landwehr 1990). Each tiling or pattern used during this procedure, of course, can also be described with regard to its symmetry group (Coxeter 1961), which alone makes for several "layers" ("surface edricity", "underlying lattice structure", etc.). It does not seem difficult to imagine, how a myriad of technological and artistic applications opens up, once we look at perception from the point of view suggested here.

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