# Understanding the Visual Language of Design:
# A Hierarchical Approach to *Gestalt* Formalism

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Excursa

This paper comes about for several reasons and since its topic is rather esoteric, I think it important to give some background. Several years of guiding landscape design courses, required me to develop a semantical and systematical method for teaching visual design. I did this to aid the students' understanding by structuring visual properties that are normally difficult to verbalize. That these properties are so hard to verbalize is evident in the terminology used in discussions and descriptions by visual designers. There always seems to be a list of design adjectives followed by "etc.". The order and relationship of their lists never coincides nor are they structured in any logical way.

Secondly, the research area for my dissertation centers on the synthesis of visual quality and ecological structure. While visual quality is not necessarily the same as visual design, it strikes me that much of what is written about visual quality and visual resource management of landscapes and how to apply such an endeavor (however normative it might seem) is done with pictures. Words as part of a verbal language therefore offer a translation of a complementary way of knowing. This translation of a visual language in to a verbal one may begin like Gregory Bateson's (1979) dictum regarding description (translation) in general, "Division [translation/structuring] of the perceived world in to parts and wholes is convenient and may be necessary, but no necessity determines how it shall be done."[1], Echoed in a different by Gerard (1969) "You have to structure it (nature) to be able to do something about it; but...you mustn't take it [the structure] too seriously" The essence of language is, however, in communicating to others without re-inventing the description each time, acknowledging our impatience with an "etc." The question is, it seems to me whether one can delimit a set of constructs which can be used to detect basic repeatable elements interwoven in a complex visual world and to see if these constructs function hierarchically This allows the user to represent visual complexity (Whyte 1969) and to communicate it.

The Human and Language

[1] Bateson, Gregory 1979. *Mind and Nature: A Necessary Unity.* p. 42 New York:Dutton

According to Jon Lang (1985), "Writing, painting and architecture are all means of communicating ideas about society ..." If one is to communicate, there needs to be rules and structure, so abstract concepts such found in visual phenomena find consensus. Semanticist S. I. Hayakawa declares, ""Vision shares with speech the distinction of being the most important means by which apprehend reality."

This paper allowed me to start reading about design and understanding it as a human language in which grammar is simply another way of denoting contextual shaping. (Bateson 1979). Bateson also states that "things can only enter the world of communication and meaning by their names, qualities, or attributes." Verbal language deals mainly with names, visual language mostly with qualities and attributes. Visual rules would make it a linguistic, complementary way of knowing about reality. Gardner (1982) notes anthropologist Levi-Strauss as indicating "...the principal feature of all minds is to classify..." "Individuals devise concepts and comparisons ...because they satisfy cognitive constraints (they are good to 'think with')." Biologist, Lancelot Law Whyte (1969) understands the language and the observer in the system,

> "As humans, we belong to that component of nature given to organizing and structuring. We not only physically organize ourselves and our environment, but we also organize our perceptions of the physical world into abstract structures. When we project these abstractions back onto the physical world, their usefulness leads us to surmise that they reflect to some degree a structure possessing independent existence."

A language consists of a set of recognizable, mutually agreed upon symbols which convey meaning. It is different for verbal and visual languages. These symbols can change in meaning as the observer or receiver understands them in various contexts. A verbal language is a complex system of discursive symbolism in which Susan Langer states in Gardner (1982),

> "one notes the meaning of each term, combines them according to accepted rules of syntax and arrives at a commonly shared meaning..[as opposed to]..Presentational symbolism [occurs when] an idea could be gleaned from a picture. [They] present themselves and must be apprehended as a whole, moreover, they operate primarily through shades of meaning, nuances, connotations and feelings."

Yet one must not expect a visual language to be a direct analog of the verbal as does Nelson Goodman, who is concerned with "notationality"- a reproducible set of symbols which will provide meaning. He says,

> "visual language does not have notationality,"... because " the meaning universe of language is chock-full of ambiguity, redundancy, and other blurring features. ...[A]rtforms such as painting, and sculpture violate all criteria of notationality. One can not ascertain what the constituent elements are (there are no equivalents to words or notes in paintings), or how the might conceivably be combined, or what the elements of the work or the work as a whole stand for or represent."

The Problem

The theory of *Gestalt* psychology has been a major influence in environmental design. It posits that the brain immediately organizes inputs and that much of what humans perceive is in the visual mode. Other approaches to perception, namely transactionalist (experiential) (Ittleson et al 1976) and ecological (Gibson 1979) have questioned these *Gestalt* concepts. Though Gyorgy Kepes, a leading exponent of *Gestalt* design did not rule out other approaches:

> "One does not see every aspect of visible things and events; one selects and arranges the visual stimulations according to one's attitude toward [them]. To the same degree that the knowledge of the environment and the habits and attitudes toward the environment change, the visual habits of representation will also change." p.68

In order to provide structure as a learning aid for my students, I first began with a simple two-dimensional matrix trying to relate each descriptive term one to another. This did not work ; there was not a simple, one to one correspondence. Certain things appeared to be fundamentally irreducible, (what I called elements). Others did not, but still depended on elements for their coming into being. In this paper I have selected the *Gestalt* theoretical approach to viewing visual elements and will attempt to show their complex relationships work as a hierarchically structured visual language.

The rise of *Gestalt* theories in Germany influenced architects of the *Bauhaus* and abstract visual artists. Its attractions, the concepts of form, isomorphism, and field forces and 'laws' of structure, may have been of most interest to visual artists who tend to have a developed sense of visual structure that is imposed on a scene. In this respect, a visually-oriented artist is not unlike a scientist in a system of observer and observed. The artist and the scientist in this system are both interested in humanly-scaled phenomena as noted by Allen and Starr (1982),

> "The artist focuses his attention on the inconsistencies between expectations and what unfolds. The inconsistencies then draw attention to what has been taken for granted or what it is to be human; the apparent contradictions focus on human scale.....Both the artist and the scientist are conscious of the human scale, but the artist celebrates it while the scientist tries to eliminate its effect."

*Form* is a basic concept in visual organization revealing itself as an identifiable entity. *Isomorphism*, as such, will not be used in the hierarchical approach, except that it is the hypothesized neurological analog which requires the mind to

spontaneously create (see) form. Arnhem (1965) in effect sees isomorphism as a precognitive 'hotwire' in the physiological processes of the brain. The last basic concept is that of *field forces* , which is more complex than that of *form* , because it is not a physiological effect. It is situational (contextual), dealing with the relationships, direction and magnitude, between two or more forms. According to Lang (1985) "It is governed by the principle of *Pragnanz* and takes the most stable form under the circumstances." Though not normally described as such in *Gestalt* theory, I believe *Pragnanz* occurs differently in different observers and is compatible with both the Transactional and Ecological views of perception.

Forms are entities seen as figures against backgrounds. It is analogous to Bateson's (1979) "news of a difference that makes a difference." It is the basic level of structure which allows an observation to be made. We do not organize extracted figures from a background without applying these laws: *proximity, similarity, closure, continuance, closedness, area,* and *symmetry* (Lang 1985). "Proximity is the simplest condition of organization." Kepes (1944) p. 46. In *proximity*, objects that are closer together are grouped (aggregated) into a larger (more stable?) structure to provide the simplest interpretation. This can however be modified by *similarity* when if some of the aggregated objects have like, color, shape, and texture. When neither of these laws holds sway, ambiguity is present; then rescanning of objects by the eye creates an unsettling unstable attribute in the observer called tension. *Closure* dictates that "incomplete" visual objects will tend to be completed and seen as a whole, based on an implied extension of the parts to create such a whole. As with *similarity* ambiguity as to what would be the simplest projected whole leads to instability and tension. Closely related to *similarity*, and *closure*, is *continuance* which directs observers to understand continuous objects as one. This is most common in the form of implied lines extending between isolated objects in the visual field. Weaker "laws" are *closedness* and *area*. *Closedness* requires that an object is defined by the line (edge) which surrounds it and an area is seen as a figure if it is small and a field if it is large. *Symmetry* is stated to imbue a closed area relatively more importance. These "laws" are obviously open to a range of ambiguity, tension and hence instability.

## An Overview of Hierarchy Theory

Simply put, hierarchy is a tool to structure complexity. In it a number of levels decompose in to smaller sub-levels and simultaneously compose to higher levels. However they are not mere aggregations but wholistic units. Hierarchy theory is especially useful in defining interfaces between two levels. These levels and their relationships are

governed by rules. Mesarovic and Macko (Whyte 1969) describe several which are of potential use in the ordering of visual language.

1) They take note of descriptors: "For each level there is a set of relevant features, variables, laws, and principles in terms of which the system's behavior is described." p. 30

2) They describe interrelationships: "For such a hierarchy to be effective it is necessary that the description on any level be considered independent of the description at other levels." p. 30

3) They position the observer in the system: "Selection of the strata (levels) in which a given system is described depends upon the observer, his knowledge and interest in the operation of the system....stratification is an interpretation of the system." p. 32 .

4) They delimit the inter-relationships between descriptors: "Each stratum (level) has its own set of terms, concepts and principles and what is considered as a system and its objects (descriptors) are different on each stratum. Furthermore, there is a hierarchy of objects and languages in which they are described." p. 33.John Platt has also noted that, "In general the internal language of a system [level] is never the same as its exchange language to the environment [next level up] or to other systems [on the same level]." (Whyte 1969 p.207)

5) They position the flow between levels: "By moving up the hierarchy, the description becomes broader and refers and refers to larger subsystems.. p. 35 .

A Visual Language

A visual language is important to environmental designers so that they can translate between verbal concepts,, (i.e. the "naming" of Bateson (1979)) and the discursive and presentational symbolism of Langer (Gardner 1982). It can now address the *Gestaltic* way in which the 20th Century west, especially those designers of the 'Modern Movement" saw reality and attempted to interpret and reshape it.

> "The reorganization of our visual habits so that we perceive not isolated 'things' in 'space' but structure, order and the relatedness of events in space-time, is perhaps the most profound kind of revolution possible--a revolution that is long overdue not only in art but all our experience." Hayakawa, S. I. 1939. *Language in Thought and Action*. New York: Harcourt-Brace.

Using the gestalt visual imagery rules, I will attempt to create a hierarchical visual language. What are the basic descriptors that can be utilized? What can be used as a starting point?

Whyte (1969) suggests measurable properties such as, lengths, angles, time, masses, potentials, etc.) Because it is a basic element of Gestalt let us begin at one level with form. But how do we know form exists?

> "Exposed to a visual field that in its light quality is to the slightest degree heterogeneous, one organizes that field into two opposing elements; into a figure against a background." (Kepes 1944 p. 31)

In animal camouflage, our reliance on elementary visual entities overpowers our learned knowledge of its form smears the animal into the background as if it never existed..

What is it that separates it from the nothingness of background? Landscape architects Ian Laurie (1976) and Florence Bell Robinson (1940) among many others point to color and texture as definers of form. Nelson Goodman (1968) points to shape and color as "salient, specific qualities." When a color or texture reaches a threshold differentiating it from its background it immediate assumes a form. Laurie notes that color and texture are properties of surfaces. Robinson in her book *Planting Design*, emphasizes, "[Form] lies within finite boundaries of experience. And only in so far as color and texture partake of the limitations of form do they fall within the perception of the average individual....We think only in terms of form." p.61. She goes on elsewhere, "Line, color and texture are essentially expressions of form....They are so closely inter-related that any distinction or separation is arbitrary, purely for purposes of study." .p.60.

The visual world is full of forms of differing colors and textures, each with an implied line as a boundary. As indicated earlier, boundaries are critical aspects in hierarchies.

> "The boundary surface for one property ...will tend to coincide with the boundary surfaces for many other properties.. because the surfaces are *mutually re-enforcing*. I think this somewhat astonishing regularity of nature has not been sufficiency emphasized in perception-philosophy. It is this that makes it useful and possible for use to identify certain sharply defined regions of space as 'objects.' This is what makes a collection of properties a 'thing' rather than a smear of overlapping images." (Platt 1969. p. 203)

In the three dimensions of spatial reality, humans move through space and around mass. In so moving through space that movement assumes form as well according to Robinson, "Mass is composed of forms, form is built upon line or direction and both are bounded by silhouette. Thus mass and form, line and silhouette must be consider together," p.62. Even in an ecological sense as stated by Allen and Starr (1982), "The meaning and consequence of structural boundaries are more readily observed and so understood than functional boundaries." p.70.

Once a figure or figures emerge from the background, these objects begin to interact. Kepes (1944) describes this wholistic system:

> "..the optical units organized into spatial configurations become more than the sum of their component parts. These larger wholes form with other groups a still farther reaching unit , and this process continues until all possible relationships are exhausted. ... The number of units can be increased in so far as they do not interfere, forming further units. But when this point of saturation is reached, there is no further opportunity for plastic organization. A uniformity of surface is produced on new level." p. 51.

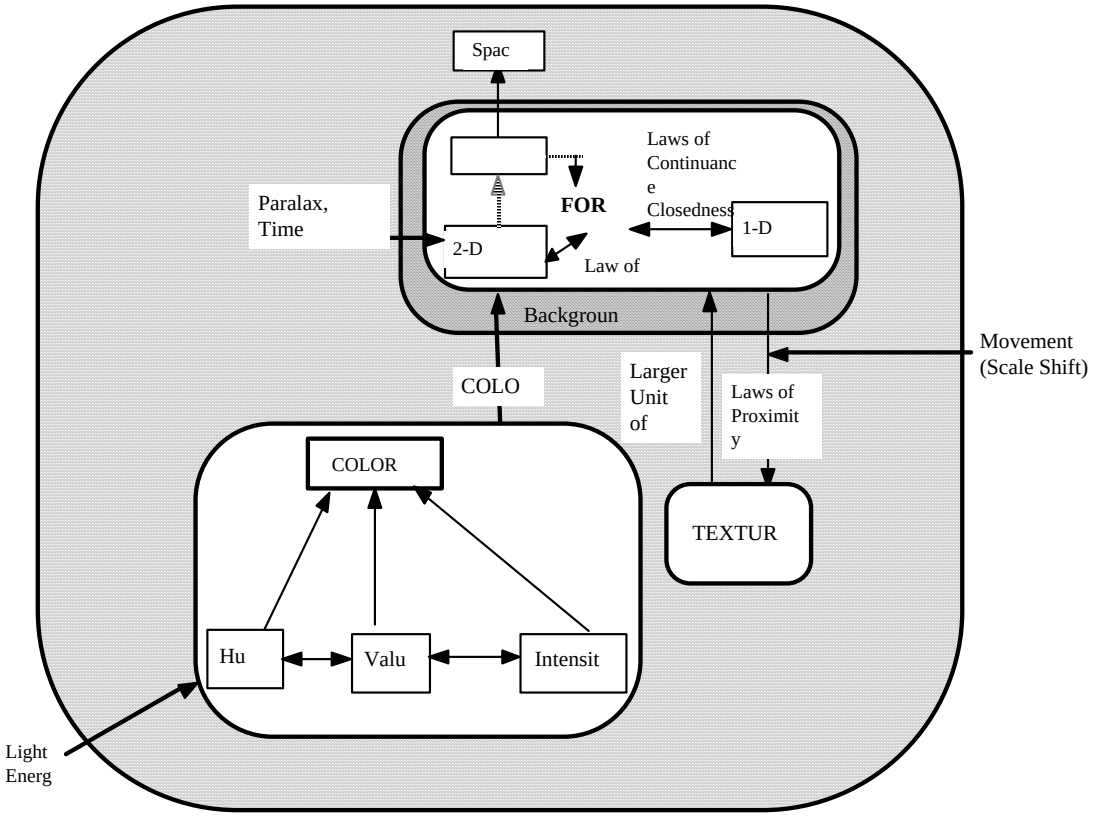
What, however, are the basic relationships that account for the process? They appear to be the law of gestalt organization noted earlier, *proximity, similarity, closure, continuance, closedness, area,* and *symmetry* (Lang 1985).

Figure 1 shows a relationship between the basic visual unit, color, and its relationship with texture to create space.

> "Confronted with a complex optical field, one will reduce it to basic inter-relationships. Just as in nature there is a tendency to find the most economic surface unity in every formation, so in visual organization there is the tendency to find the most economic spatial unity in the ordering of the optical differences." p. 45.

Viewing a painting or a landscape we tend to concentrate, or so it seems, on the objects portrayed by the arrangement of colored fields. However, hierarchical thinking and organization, places equal if not greater emphasis on the inter-relationships. Here again Kepes (1944) demonstrates such thinking in a *Gestalt* approach to visual hierarchies:

"The forces of visual attraction--a point, a line, an area--exist in an optical background and act upon an optical field. This optical field is projected on the retinal surface of the eyes as an inseparable background for the distinct visual units. One can not, therefore perceive visual units as isolated entities but relationships....[they] derive their qualities in relationship to their respective backgrounds, ranging from immediate surrounding surface to the optical field as a whole." p. 17.




**Hierarchical Relationships, Inputs and Outputs For Basic Elements of a Gestalt Visual Language**

Figure 1

At a sub-level, color is not a mere aggregation of physical properties. The interference patterns of various juxtaposed colors dilute or attenuate; a final color emerges. The system is driven by the input of light energy that is reflected to the eye. Kepes (1944) describes it this way:

"The actual visual elements are not only the focal points of this field; they are the concentrated energy. Color, value, texture, point, line area radiate different amounts of energy and thus each element or quality can encompass a different radius of the picture surface. These fields extend into every dimension and each field has its own unique form." p. 29.

Colored forms can also interact creating a shape grammar. For example Knight (1989) notes that a starting shape and a set of rules applied recursively makes a series of related shapes which he calls a language. A color grammar additionally incorporates a third rule that applies to the color field, It is "a continuous or discontinuous, finite

region of space that is filled with one or more non-overlapping colors...formed from lower-level entities called color spots. Fields and spots differ from shapes and lines [in that they] are color defined as well as spatially defined" p. 419-420 Adding new energy to the system by parallax or movement brings about the emergence of a third dimension from what was originally a one or two-dimensional 'figure' form against a background or field. The emergence of depth appears according to Knight, "when fields overlap "..."[A] new relationship occurs; one not found in over-lapping lines. The four affects arising are, opacity/transparency and layering and weaving. Depending on the color and its opacity or transparency the relationship creates depth and therefore space, [something] not happening with simply overlaid lines." p 421

As with any hierarchically arranged system, stability occurs when the constituent levels and their relationships are also stable. Moving about a landscape or adding new light sources disturbs the system, sending it into a dynamic reconstitution of forms. The system itself does not change, merely our attention to detail and scale. Kepes (1944) describes the process leading again to a stable visual system:

> "The ultimate aim of plastic organization is a structure of movement that dictates the direction and progression and the progression toward ever new spatial relationships until the experience achieves it fullest spatial saturation." p. 52.

Rhythm and sequence are higher level temporal and spatial relationships between forms (Kepes 1944). Because rhythm is driven by the searching of human vision, energy is expended. This energy results in greater consolidation of units, "in seeing organization and its relaxation upon balance. (Kepes 1944)." Arnhiem (1954) adds, "In a balanced composition all such factors as shape, direction and location are mutually determined by each other in such a way that not change seems possible and the whole assumes the character of "necessity" in all its parts. An unbalanced composition looks accidental, transitory and therefore invalid." p.12. Balance and simplicity appear to be relationships which bestow stability. For example, symmetry as a law of *Gestalt* organization comes about by simple balance of forms equidistance from an axis. Sequence is the linear order and direction of the rhythmic movement.

Robinson (1940) has posed several rules of combination in planting design which tend to produce stable (harmonious) visual fields:

[1]"Scale may vary if rhythm is constant
[2] rhythm may vary if scale is constant ..
[3] both scale and rhythm may vary if direction is constant..
[4] Unity occurs where all [scale, rhythm, direction, form, texture, and color] are constant. But constant and complete rhythm grows monotonous.....
[5] Texture and color may vary if the form is constant.
[6] Texture and form may vary if color is constant.
At least one uniform factor is essential for harmony." p.75.

Most humans will be able to agree on the lower order forms, but as more energy and thought is invested in a complex visual field the more discrimination and judgment will be call for by the observer. Unstable configurations of forms and ambiguity-induced tension invite arbitrary and humanly-imposed structure. Aesthetician, Nelson Goodman declares;

> "...We have to read the painting [landscape?] as well as the poem and that aesthetic experience is dynamic rather than static. It involves making delicate discriminations and discerning subtle relationships, identifying symbol systems and characters within these systems and what these characters denote and exemplify, interpreting works and reorganizing the world in terms of works and works in terms of the world." p 241

The structure as it then exists will be meaning applied to a dynamical system. By bringing the human viewer into the system discernment of symbols can occur. It is then that the visual field becomes a language.

"In sum," Nelson Goodman ( 1968) states, "effective representation and description require invention. They are creative. They inform each other; and they form, relate, and distinguish objects. That nature imitates art is too timid a dictum. Nature is product of art (visual language) and discourse (verbal language)." p.33

End Notes and Quotes

"As humans, we belong to that component of nature given to organizing and structuring. We not only physically organize ourselves and our environment, but we also organize our perceptions of the physical world into abstract structures. When we project these abstractions back onto the physical world, their usefulness leads us to surmise that they reflect to some degree a structure possessing independent existence." Whyte, Lancelot Law 1969. "Hierarchy in Concept " in *Hierarchical Structures* Whyte, L. L., A. Wilson and D. Wilson (eds.) p. 1 New York:Elsevier.

Structural hierarchy represents complexity LL Whyte

Methodology of levels Mario Bunge 1969. "Metaphysics, Epistemology and Methodology of Levels" in *Hierarchical Structures* Whyte, L. L., A. Wilson and D. Wilson (eds.) p. 25 New York:Elsevier

"For each level there is a set of relevant features , variables, laws, and principles in terms of which the system's behavior is described. For such a hierarchy to be effective it is necessary that the description on any level be considered independent of the description at other levels." Mesarovic' M. D. and D. Macko. 1969 "Scientific Theory of Hierarchical Systems". in *Hierarchical Structures* Whyte, L. L., A. Wilson and D. Wilson (eds.) p. 30 New York:Elsevier

"Selection of the strata in which a given system is described depends upon the observer, his knowledge and interest in the operation of the system....stratification is an interpretation of the system." Mesarovic' M. D. and D. Macko. 1969 "Scientific Theory of Hierarchical Systems". in *Hierarchical Structures* Whyte, L. L., A. Wilson and D. Wilson (eds.) p. 32 New York:Elsevier.

"Each Stratum has its own set of terms, concepts and principles and what is considered as a system and its objects are different on each stratum. Furthermore, there is a hierarchy of objects and languages in which they are described." Mesarovic' M. D. and D. Macko. 1969 "Scientific Theory of Hierarchical Systems". in *Hierarchical Structures* Whyte, L. L., A. Wilson and D. Wilson (eds.) p. 33 New York:Elsevier

"By moving up the hierarchy, the description becomes broader and refers and refers to larger subsystems.." Mesarovic' M. D. and D. Macko. 1969 "Scientific Theory of Hierarchical Systems". in *Hierarchical Structures* Whyte, L. L., A. Wilson and D. Wilson (eds.) p. 35 New York:Elsevier.

"What measurable properties( angles, lengths, times, masses, potentials etc.) are associated with each level? Lancelot Law Whyte. 1969 "Five Questions". in *Hierarchical Structures* Whyte, L. L., A. Wilson and D. Wilson (eds.) p. 51 New York:Elsevier.

"What we call natural interfaces are identifiable either by...*decomposability* , or through the existence of some form of closure. The most apparent form of closure is t*opological* closure -- the encompassing by (one or more) closed surfaces of a spatial neighborhood that coincides with or bounds the extension of a physical object." Wilson, Albert. 1969 Closure, Entity and Level" . in *Hierarchical Structures* Whyte, L. L., A. Wilson and D. Wilson (eds.) p. 54 New York:Elsevier.

"You have to structure it (nature) to be able to do something about it; but...you mustn't take it too seriously" Gerard, R.W. 1969,. "Hierarchy, Entitation and Levels" in *Hierarchical Structures* Whyte, L. L., A. Wilson and D. Wilson (eds.) p. 219 New York:Elsevier.

"The boundary surface for one property ...will tend to coincide with the boundary surfaces for many other properties.. because the surfaces are *mutually re-enforcing*. I think this somewhat astonishing regularity of nature has not been sufficiency emphasized in perception-philosophy. It is this that makes it useful and possible for use to identify certain sharply defined regions of space as 'objects.' This is what makes a collection of properties a 'thing' rather than a smear of overlapping images" Platt, John. 1969. in *Hierarchical Structures* Whyte, L. L., A. Wilson and D. Wilson (eds.) p. 203 New York:Elsevier.

"All gradient and flows in the region very near the boundary will tend to be either parallel or perpendicular to the boundary." Platt, John. 1969. in *Hierarchical Structures* Whyte, L. L., A. Wilson and D. Wilson (eds.) p. 204 New York:Elsevier.

"In general the internal language of a system is never the same as its exchange language to the environment or to other systems." Platt, John. 1969. in *Hierarchical Structures* Whyte, L. L., A. Wilson and D. Wilson (eds.) p. 207 New York:Elsevier.

Gardner notes anthropologist Levi-Strauss as indicating "...the principal feature of all minds is to classify..." ""Individuals devise concepts and comparisons ...because they satisfy cognitive constraints (they are good to 'think with'). Gardner, Howard. 1982. *Art, Mind and Brain* New York:Basic Books. p 33.

Susan Langer: Discursive symbolism in which "one notes the meaning of each term, combines them according to accepted rules of syntax and arrives at a commonly shared meaning....Presentational symbolism in which an idea could be gleaned from a picture. [They] present themselves and must be apprehended as a whole, moreover, they operate primarily through shades of meaning, nuances, connotations and feelings." Gardner, Howard. 1982. *Art, Mind and Brain* New York:Basic Books. p 51.

Nelson Goodman: "verbal language does not have notationality, because " the meaning universe of language is chock-full of ambiguity, redundancy, and other blurring features. ...[A]rtforms such as painting, and sculpture violate all criteria of notationality. One can not ascertain what the constituent elements are (there are no equivalents to words or notes in paintings), or how the might conceivably be combined, or what the elements of the work or the work as a whole stand for or represent. Painting is filled with multiple meanings at every possible level." Gardner, Howard. 1982. *Art, Mind and Brain* New York:Basic Books. p 57.

Goodman: "Whether symbols [e.g., lines] function as artistic symbols depends upon which of the properties of the symbol one attends to." Gardner, Howard. 1982. *Art, Mind and Brain* New York:Basic Books. p 58.

Gardner on Goodman's art of sampling; "In Goodman's view, works of art can be profitably viewed as samples....Versions of the world that strike as 'fair' or 'right' are those that seem to capture significant aspects of our own experiences, perceptions, attitudes and intuitions"..That is a swatch"...reflecting the principal features of the entire bolt"/

"In sum, effective representation and description require invention. They are creative. They inform each other; and they form, relate, and distinguish objects. That nature imitates art is too timid a dictum. Nature is product of art and discourse." Goodman, Nelson. 1968. *Languages of Art* New York:Bobbs-Merrill p.33

"...We have to read the painting as well as the poem and that aesthetic experience is dynamic rather than static. It involves making delicate discriminations and discerning subtle relationships, identifying symbol systems and characters

within these systems and what these characters denote and exemplify, interpreting works and reorganizing the world in terms of works and works in terms of the world." Goodman, Nelson. 1968. *Languages of Art* New York:Bobbs-Merrill p 241

"To think of science as motivated ultimately by practical goals, as judged or justified by bridges and bombs and the control of nature, is to confuse science with technology. Science seeks knowledge without regard to practical consequences, and is concerned with prediction not as a guide for behavior but as a test of truth. Disinterested inquiry embraces both scientific and aesthetic experience." Goodman, Nelson. 1968. *Languages of Art* New York:Bobbs-Merrill. p 242.

"Most of the troubles [in the function of feeling] that have been plaguing us can, I have suggested, be blamed on the Domineering dichotomy between cognitive and emotive" this separation "...keeps us form seeing that the emotions function cognitively."

"...salient specific qualities of color, shape...."Goodman, Nelson. 1968. *Languages of Art* New York:Bobbs-Merrill 261

"The artist focuses his attention on the inconsistencies between expectations and what unfolds. The inconsistencies then draw attention to what has been taken for granted or what it is to be human; the apparent contradictions focus on human scale.....Both the artist and the scientist are conscious of the human scale, but the artist celebrates it while the scientist tries to eliminate its effect." Allen, T H. F. and T. B. Starr. 1982. *Hierarchy: Perspectives for Ecological Complexity* . Chicago University Press. p.26.

YFT: Qualitative differences of space are not new relations per se, but to speed of motion in space.

von Bertalnaffy "Ultimately all boundaries are dynamic...Hence and object and particular a system is definable only by its cohesion in a broad sense, that is interactions of the component elements. In this sense an ecosystem of social system is just as real as an individual plant, animal or human; and problems, strikingly demonstrate their 'reality'...the distinction between 'real' and objects and systems as given in observation, and 'conceptual' constructs and systems cannot be drawn in any common-sense way." Allen, T H. F. and T. B. Starr. 1982. *Hierarchy: Perspectives for Ecological Complexity* . Chicago University Press. p.69

"The meaning and consequence of structural boundaries are more readily observed and so understood than functional boundaries. Allen, T H. F. and T. B. Starr. 1982. *Hierarchy: Perspectives for Ecological Complexity* . Chicago University Press. p.70.

"The most important visual relationship is scale. It is concerned with the relative size of things." Laurie, Michael. 1976. *An Introduction to Landscape Architecture* p. 133 New York:Elsvieier.

Laurie: Color and texture are properties of surfaces. Physical surfaces differentiate a line from a plane and a plane from a mass and mass from space.

Laurie: On a landscape site form is determined by the boundaries, property lines, topography, microclimate, views, adjoining buildings and so forth. The boundary must relate to those outside influences just mentioned and simultaneously the internal feature and activities. *An Introduction to Landscape Architecture* p. 133 New York:Elsvieier.

"Line, color and texture are essentially expressions of form....They are so closely inter-related that any distinction or separation is arbitrary, purely for purposes of study. Robinson, Florence Bell. 1940. *Planting Design*. New York:McGraw-Hill .p.60.

"[Form] lies within finite boundaries of experience. And only in so far as color and texture partake of the limitations of form do they fall within the perception of the average individual....We think only in terms of form." Robinson, Florence Bell. 1940. *Planting Design*. New York:McGraw-Hill .p.61.

"Mass is composed of forms, form is built upon line or direction and both are bounded by silhouette. Thus mass and form, line and silhouette must be consider together," Robinson, Florence Bell. 1940. *Planting Design*. New York:McGraw-Hill .p.62.

"Always the aim of design is *harmony*." Robinson, Florence Bell. 1940. *Planting Design*. New York:McGraw-Hill .p.65.

""...we proceed to the abstract study of mass and form...begin[ning] with a few simple outlines...from there we build up a mental perception of depth and distance, of opposition and balance, of scale and proportion, of sequence and time, of climax and interest." Robinson, Florence Bell. 1940. *Planting Design*. New York:McGraw-Hill .p.65.

"Scale may vary if rhythm is constant, rhythm may vary if scale is constant or both scale and rhythm may vary if direction is constant.. Unity occurs where all [scale, rhythm, direction *or* form texture, color] are constant. But constant and complete rhythm grows monotonous.....Texture and color may vary is the form is constant. Texture and form may vary if color is constant. At least one uniform factor is essential for harmony." Robinson, Florence Bell. 1940. *Planting Design*. New York:McGraw-Hill .p.75.

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|---|---|---|---|
| | Simplicity | | |
| | Balance | | Mass |
| Unity and harmony <=== | Scale | <==== | Texture |
| | Sequence | | Color |
| | Focalization | | |

"The reorganization of our visual habits so that we perceive not isolated 'things' in 'space' but structure, order and the relatedness of events in space-time, is perhaps the most profound kind of revolution possible--a revolution that is long overdue not only in art but all our experience." Hayakawa, S. I. 1939. *Language in Thought and Action*. New York: Harcourt-Brace.

"Vision shares with speech the distinction of being the most important means by which apprehend reality." Hayakawa, S. I 1944 "Art Means Reality" in Kepes, Gyorgy. 1944 *The Language of Vision*. Chicago: Theobald, p. 10.

"The plastic image has all the characteristics of living organism. It exists through the forces in interaction which are acting in their respective fields , and are conditioned by these fields. It has an organic spatial unity; that is the whole behavior of which is not determined by that of its individual components, but where the parts are determined by the intrinsic nature of the whole. It is, therefore, and enclosed system that reaches its dynamic unity by various levels of integration; by balance, rhythm and harmony. Kepes, Gyorgy. 1944 *The Language of Vision*. Chicago: Theobald, p. 16.

"The forces of visual attraction--a point, a line, an area--exist in an optical background and act upon an optical field. This optical field is projected on the retinal surface of the eyes as an inseparable background for the distinct visual units. One can not, therefore perceive visual units as isolated entities but relationships....[they] drive their qualities in relationship to their respective backgrounds, ranging form immediate surrounding surface to the optical field as a whole." Kepes, Gyorgy. 1944 *The Language of Vision*. Chicago: Theobald, p. 17.

"Whether we wish it or not, any optical differentiation of a picture surface generates a sense of space....by virtue of the process through which the eye organizes their visible difference into a whole." Kepes, Gyorgy. 1944 *The Language of Vision*. Chicago: Theobald, p. 18

"The actual visual elements are only the focal points of this field; they are the concentrated energy. Color, value, texture, point, line area radiate different amounts of energy and thus each element or quality can encompass a different

radius of the picture surface. These fields extend into every dimension and each field has its own unique form." Kepes, Gyorgy. 1944 *The Language of Vision*. Chicago: Theobald, p. 29.

"Exposed to a visual field that in its light quality is to the slightest degree heterogeneous, one organizes that field into two opposing elements; into a figure against a background." 1944 "Art Means Reality" in Kepes, Gyorgy. 1944 *The Language of Vision*. Chicago: Theobald, p. 31

"Confronted with a complex optical field, one will reduce it to basic inter-relationships. Just as in nature there is a tendency to find the most economic surface unity in every formation, so in visual organization there is the tendency to find the most economic spatial unity in the ordering of the optical differences." Kepes, Gyorgy. 1944 *The Language of Vision*. Chicago: Theobald, p. 45.

"Because kinship of elementary visual qualities is more fundamental to image building that the relations of empirical experience, the patterns on [a snake's body] are more easily seen together with corresponding patterns in its background form--knowledge of which is acquired in one's other experience. The snake disappears into its background. Kepes, Gyorgy. 1944 *The Language of Vision*. Chicago: Theobald, p. 45.

"Proximity is the simplest condition of organization." Kepes, Gyorgy. 1944 *The Language of Vision*. Chicago: Theobald, p. 46.

"..the optical units organized into spatial configurations become more than he sum of their component parts. These larger wholes form with other groups a still farther reaching unit , and this process continues until all possible relationships are exhausted. ... The number of units can be increased in so far as they do not interfere, forming further units. But when this point of saturation is reached, there is no further opportunity for plastic organization. A uniformity of surface is produced on new level." Kepes, Gyorgy. 1944 *The Language of Vision*. Chicago: Theobald, p. 51.

"The ultimate aim of plastic organization is a structure of movement that dictates the direction and progression and the progression toward new spatial relationships until the experience achieves it fullest spatial saturation." Kepes, Gyorgy. 1944 *The Language of Vision*. Chicago: Theobald, p. 52.

"Rhythm can not be grasped as one isolated visual sensation. Its very meaning lies in the fact that it is an order of greater temporal whole" Kepes, Gyorgy. 1944 *The Language of Vision*. Chicago: Theobald, p. 53.

Rhythm can be thought of as an active spatial (and hence temporal) search. Alternating views of figure/ground relationships ebb and flow with new spatial relationships requiring an alternation of energy expenditure in seeing organization and it relaxation upon balance.

"One does not see every aspect of visible things and events; one selects and arranges the visual stimulations according to one's attitude toward [them]. To the same degree that the knowledge of the environment and the habits and attitudes toward the environment change, the visual habits of representation will also change." Kepes, Gyorgy. 1944 *The Language of Vision*. Chicago: Theobald, p.68

"Contextual shaping is only another term for *grammar*." Bateson, Gregory 1979. *Mind and Nature: A Necessary Unity*. p. 18 New York:Dutton

"Division of the perceived world in to parts and wholes is convenient and may be necessary, but not necessity determines how it shall be done." Bateson, Gregory 1979. *Mind and Nature: A Necessary Unity*. p. 42 New York:Dutton

"..'things' are produced, are seen as separate form other things and are made real by their internal relations and by their behavior in relationship with other thing and the [viewer]....they can only enter the world of communication and meaning by their names, qualities and their attributes (i.e., by reports of their internal and external relations and their interactions)." Bateson, Gregory 1979. *Mind and Nature: A Necessary Unity*. p. 67-8 New York:Dutton

"...proceeded from a classification or typology to a study of the processes that generated the differences summarized in the typology. But the nest step was from process to typology of process....a dialectic between form and process." Bateson, Gregory 1979. *Mind and Nature: A Necessary Unity*. p. 212 New York:Dutton

"Shape is one of the essential characteristics of objects grasped by the eyes. It refers to the spatial aspects of things, excepting location and orientation. That is, shape doesn't tell us where an object is and whether it is upside down or fright side up. It concerns, first of all, the boundaries of masses." Arnhiem, Rudolf. 1954. *Art and Visual Perception*.. Berkeley:U Cal Press. p.37.

"...simplicity ...depends upon (a) the simplicity of the stimulus which gives rise to the precept (b) Simplicity of the meaning to be conveyed by the precept; (c) the relationship between meaning and precept (d) the mental set of the individual observer. Arnhiem, Rudolf. 1954. *Art and Visual Perception*.. Berkeley:U Cal Press. p.50.

Simplicity = closure/unity?

"It is quite clear that relationships between the parts depend on the structure of the whole." Arnhiem, Rudolf. 1954. *Art and Visual Perception*.. Berkeley:U Cal Press. p.66

"In a balanced composition all such factors as shape, direction and location are mutually determined by each other in such a way that not change seems possible and the whole assumes the character of "necessity" in all its parts. An unbalanced composition looks accidental, transitory and therefore invalid." Arnhiem, Rudolf. 1954. *Art and Visual Perception*.. Berkeley:U Cal Press. p.12.

A shape grammar is a starting shape and a set of rules that are applied recursively crating a series of related shapes called a language. A color grammar additionally incorporates a third rule that applies to the color field, It is "a continuous or discontinuous, finite region of space that is filled with one or more non-overlapping colors...formed from lower-level entities called color spots. Fields and spots differ from shapes and lines [in that they] are color defined as

well as spatially defined" Knight, T. W. 1989. "Color Grammars: Designing with Lines and Colors" *Environment and Planning B* 16(3) p. 419-420

when fields overlap a new relationship occurs; one not found in over-lapping lines. The four affects arising are, opacity/transparency and layering and weaving. Depending on the color and its opacity or transparency the relationship creates depth and therefore space, not happening with simply overlaid lines.

Another approach to opacity and transparency, can be thought of as continuity and discontinuity in the visual field as noted by Hillier et al (1976). If a field (e. a colored shape) is differentiated from its ground, it can be of two types, one that allows continuity of the ground (transparency) or that which is impermeable and pushes a solid (e.g. a colored shape) to the foreground. Hillier, B. P. Stansall, and M. Bedford. 1976. "Space Syntax" *Environment and Planning B.* Vol 3 147-185.