Books-By-Architects

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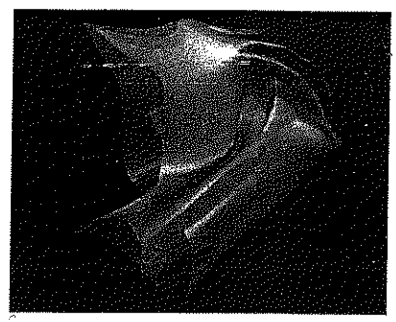
Folds, Bodies & Blobs
Collected Essays



La Lettre volée

The Renewed Novelty of Symmetry

The title of this text attempts to combine two familiar architectural concepts in a slightly unexpected way.[1] While symmetry has usually been understood in architecture as an underlying organization upon which variations are ordered, it will intead be argued here that novelty is the organizer of symmetry.[2] Rather than criticize reductive theories of eidetic types, this text will outline a generative theory of complex variation involving a reappraisal of **vague** organizations and anexact yet rigorous geometries. Similarly, idealization and differentiation have been understood as the constituents of any concept of organization based on repetition and previous theories of variation have structured their relationship around the concept of iterative reduction to ideal essences. The design for the Cardiff Bay Opera House will, in contrast, be described through processes of repetition that are evolutionary, flexible, and proliferating.

Alfred North Whitehead has described evolution as the "*creative advance into novelty*." The opera house project develops techniques of repetition that incorporate two kinds of evolutionary differentiation: **endogenous** (the unfolding of unmotivated internal directives toward diversity) and **exogenous** (the infolding of external constraints towards adaptability). This dynamic combination of internal directed indeterminacy and external vicissitudinous constraint leads to organizations that cannot be reduced to any ideal form or single cause. Complexity is an integral, generative, and stabilizing characteristic of these twofold systems of organization. In order to theorize these differential organizations, new con-

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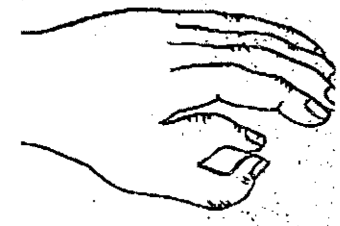
1. Human finger mutation analysis by William Bateson, 1894. This is one of two possibilities for mutations of the human hand at the site of the thumb. What is both disturbing and beautiful about this example is that the mutation replaces the asymmetry of the opposed thumb with a higher level of symmetry. In place of the thumb, the four fingers are mirrored by an additional four fingers.

cepts of order and difference must be developed that are distinct from received notions of typology and variation.

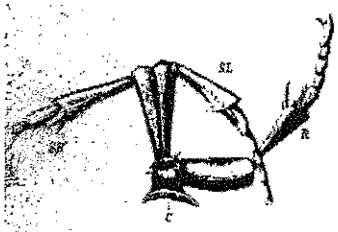
Novelty, rather than some extrinsic effect, can be conceived as the catalyst of new and unforeseeable organizations that proceed from the interaction between freely differentiating systems and their incorporation of external constraints. Novelty and order are related in an autocatalytic rather than binary manner, as they are simultaneously initiated from a constellation of vicissitudes.[3] This regime of dynamical organizations should be understood as neither neo-Platonist nor neo-Darwinist since it is not merely reducible to external or internal constraints. The resistance to both fixed types and random mutation makes flexible, adaptable, emergent, and generative systems a provocative basis for contemporary techniques of organization and explorations of dynamic architectural concepts of symmetry.

The competition brief for the Cardiff Bay Opera House was explicit about two expectations: first, that the project have a symmetrical horseshoe opera hall and, second, that the primary urban concern be a strong yet innovative relationship to the historic site of the Oval Basin. Initially, it seemed odd that in 1994, the authors of the competition would both ask for a new architecture and legislate formal symmetry. The dilemma inherent to these seemingly contradictory constraints became the catalyst for the project. After rejecting both the revolutionary potential of refusing these requests and the reactionary possibilities of supplicating to a predefined catalogue of Beaux-Arts partis, our design team decided to take a monstrously evolutionary position by incorporating both oval forms and symmetry so thoroughly that they could proliferate wildly in unexpected ways. In other words, the competition brief's strange coupling of requests for newness and symmetry initiated the present discussions of novelty and symmetry.



2. Human thumb mutation analyses by Bateson, 1894. This is the second of two possibilities for mutation about the human thumb due to a loss in information. In this case, the mutation exhibits a higher level of symmetry than the norm. Within the asymmetry of the hand, the thumb is symmetrically mirrored by an extra opposed thumb, adding a second level of local symmetry.

The project became an experiment in the development of new concepts and techniques for contextualism. The competition organizers were emphatic in their desire for an institution that could be understood as absolutely continuous with its context while having a distinctly new identity. They hoped to reconfigure the defunct industrial waterfront as a cultural and recreational center while maintaining the urban fabric and atmosphere of the shipyards. We therefore attempted to evolve a new identity that could be understood as emerging from its urban, institutional, temporal and cultural setting. To avoid the mere reproduction of the existing context, unification was approached through processes of differentiation rather than simplification, through mutation rather than duplication. We defined the **new** in architecture as being **unattributably different yet continuous** - an architecture that cannot be localized within any previous context but has been sponsored nonetheless by existing orders. Like a monstrosity that, despite its difference, can still be understood as inhabiting the familiar class of the normal, the project



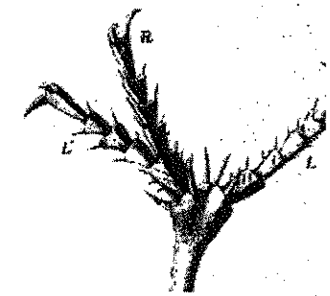
3. *Coleoptera beetle leg mutation analysis by Bateson, 1894. A fused condition of a normal right leg bearing an extra pair of right and left legs.*

attempted to turn the indigenous information of its context into an alien novelty. In the design, the context was understood as a gradient field of generalized and unorganized information rather than as a repository of fixed values, rules and codes. Our tactic was to treat the rusting technological husks of the shipbuilding industry, such as the Oval Basin, as the chrysalis for the incubation of a new urban structure. The maintenance of the Oval Basin and a compulsion for symmetry became the directives for differential growth. The progressive assimilation of differences within this system led to an emergent organization that was unpredictable at the outset and irreducible at its conclusion to either the external constraints of its context or the internal parameters of the competition program.

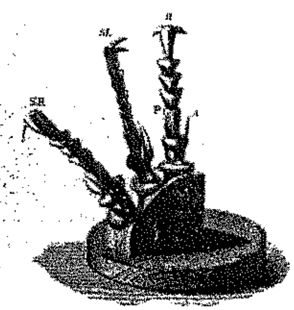
After determining that the judges and authors of the project were very serious in their desires for symmetry, we specified a series of organizational guidelines for the project. The parameters of the project involved an adherence to rules of symmetry at all scales. Directed indeterminate growth became the motto for this approach, where a series of intuitions about abstract organizations (such as predilection for oval basins and the symmetrical disposition of forms) were formulated as directives that would be triggered and guided by external constraints. We combined these intuited parameters with the contingencies of the unorganized context and began to study the generative fields that ensued as we organized the context. These generative fields emerged from the double constraints of internal directives and external vicissitudes.

During the design of the project, we became increasingly interested in theories of symmetry and discontinuous variation developed by William Bateson in 1894.[4] What we found most striking about Bateson's Rule is the relationship between order and variation and homogeneity and heterogeneity. Bateson's insight, which has since been reaffirmed by his son Gregory, is that a loss of information is accompanied by an increase in symmetry. This seems quite plausible given that "***iterative reduction** through **phenomenological variation***" involves the elimination of difference (or more technically, what would be referred to as "***alterations of deformation***") toward a reduced "***eidetic type***." Here, the terms information and difference are almost interchangeable. Homogeneity is understood as sameness or lack of difference, while disorganization is associated with an absence of difference (information) and therefore of symmetry. In this way, difference, information, and organization are related. Gregory Bateson has gone so far as to define information as "*the difference that makes the difference*."[5]

William Bateson did not arrive at this theory of symmetry through classical reduction to types but rather by attempting to theorize processes of variation outside of their defective relationship to a norm.[6] His views on symmetry are explanatory rather than taxonomic. For Bateson, monstrosities and mutations are specific polymorphic expressions of growth and



4. *Coleoptera beetle leg mutation analysis by Bateson, 1894. Examples of mirror symmetry in limb appendages such as this are the foundation for what is now referred to as "Bateson's Rule." The additional legs are aligned in a cascading relationship based on planes of mirror symmetry orientation between duplicate limbs. The normal limb is opposed along a mirror plane by an extra right limb, which is then opposed along a mirror plane by an extra left limb.*



5. *Machine constructed by Bateson, 1894. A mechanical device showing the relations of secondary symmetry of normal right (R), extra left (SL), and extra right (SR) legs. The normal right leg is attached to the circular base about which it rotates on center. The orientation of the normal leg is registered in relationship to the beetle's body using a wedge-shaped block. The extra left and extra right legs rotate at the center of this block. At the base of each leg is a gear that translates the rotation of the normal leg through each of the extra legs. For example, if the normal right leg is rotated counterclockwise forty degrees off perpendicular to the body (using the wedge-shaped dial), that rotation will be translated through the gears into a forty-degree clockwise rotation in the extra left leg and a forty-degree counterclockwise rotation in the extra right leg.*

variation responding to particular temporal and environmental conditions. This theory, along with Francis Galton's "*multiple positions of organic stability*," is temporalized by Conrad Waddington's concept of the epigenetic landscape.[7] Against Darwin, Bateson postulated a theory of "essential diversity" rather than "*random mutation*" and organization through "***discontinuous variation***" rather than "***gradualism***." As a teratologist, he realized that even monstrosities adhere to recognizable forms of those classified as normal and they therefore might lead to a theory of order that does not treat the variant as merely contingent or extraneous. He argued that variant forms are as definite and well formed as typical forms. The variations of monstrosities led him to a two fold theory of diversity and differentiation. Like the earliest experimental morphology studies of Hydra and Planaria by Abraham Tremblely, Bateson looked for typicality in the atypical.[8]

In his classic example of the two possible mutation of the thumb, Bateson demonstrated that the monstrosities display higher degrees of symmetry than do normal hands. On one hand, the normal asymmetry between four fingers and the thumb is replaced by two groups of four fingers reflected along a mirror axis. On another hand, nested within the normal asymmetry of the thumb and four fingers is a second level of mirror symmetry between the normal thumb and an extra thumb. The existence of mutations that exhibit higher degrees of symmetry than the norm led to contradictory explanations. The taxonomic

hypothesis locates extra information at the point of mutation in order to explain the increase in symmetry and the decrease in heterogeneity. Bateson proposed an alternative explanation whereby the decrease in asymmetry and the increase in homogeneity was a result of a loss of information. He argued that where information is lost or mutated, growth reverts to simple symmetry. Thus symmetry was not an underlying principle of the essential order of the whole organism, but was instead a default value used in cases of minimal information. Organisms are not attributed to any ideal reduced type or single organization; rather, they are the result of dynamic non-linear interactions of internal symmetries with the vicissitudes of a disorganized context. These contexts become "*generative fields*" once they are organized by flexible and adaptable systems that integrate their differences in the form of informational constraints.

For these types of morphological processes Bateson invented the term "*genetics*." Genes are not generators but modifiers or regulators that are intermittently applied during growth and regeneration. In the case of Bateson's Rule, information regulates simple mirror symmetries by introducing heterogeneity and difference as a form of organization. Gregory Bateson qualifies the idea of "*information selecting asymmetry*" as "***information preventing symmetry***." Genetic information excludes potential default positions of stability, like a governor or rheostat that excludes alternative possible states through feedback. Genes do not provide a blueprint in this theory but rather guide development at critical junctures by excluding simple default organizations. By differentiating in this manner, predetermined potentials are replaced with novel possibilities that are initiated by general external information and integrated within specific internal parameters.

The modifying information that generates heterogeneity was explained as a specific response to perturbations that could be either environmental or genetic. Symmetry breaking is therefore a sign of the incorporation of information into a system from the outside in order to unfold its own latent diversities. Contexts lack specific organization and the information that they provide tends to be general. In this regard, contexts might be understood as entropic in their homogeneity and uniform distribution of differences. Adaptive catalysts configure this information by breaking their own internal symmetry and homogeneity in order to differentiate heterogeneously. Gregory Bateson gives the example of an unfertilized frog's egg that develops a plane of bilateral symmetry as an embryo depending on the point of entry of a spermatozoon. Bateson substituted this point of entry by pricking the egg's surface with a camel's hair, along which a plane of bilateral symmetry grew. In this example, the message from the context is relatively general, while the internal context into which his indefinite information is received must be exceedingly complex. While the external information is general, the response that it triggers is specific. The egg initially exhibits a high degree of simplicity and radial symmetry. As it unfolds in an open relationship with its environment, it breaks symmetry, differentiates, and becomes more complex and heterogeneous because of its feedback with exigencies and constraints outside of its control.

Symmetry breaking is not a loss but an increase in organization within an open, flexible, and adaptive system. Symmetry breaking from the exact to the anexact is the primary characteristic of supply systems. These flexible economies index the incorporation of generalized external information through the specific unfolding of polymorphic, dynamic, flexible and adaptive systems. Symmetry is not a sign of underlying order but an indication of a lack of order due to an absence of interaction with larger external forces and environments. Given this complex conceptualization of endogenous and exogenous forces, deep structure and typology are just what they seem to be: suspect, reductive, empty and bankrupt. An alternative is an internal system of directed indeterminate growth that is differentiated by general and unpredictable external influences, producing emergent, unforeseen, unpredictable, dynamic and novel organizations.

endnotes

1. I would like to thank Jesse Reiser for coining this term in reference to the design of the Cardiff Bay Opera House Project.

2. I have dealt with the relationship between order (of which symmetry is perhaps a primary example) and variation in more detail elsewhere. See my "New Variations on the Rowe Complex" and "Multiplicitous and Inorganic Bodies" in this collection.

3. See my "Architectural Curvilinearity: The Folded, the Pliant and the Supple in Architecture" in this collection.

4. William Bateson, Materials for the Study of Variation: Treated with Especial Regard to Discontinuity in the Origin of Species (Baltimore, 1992; 1894).

5. I would like to thank Mark Rakatansky for bringing to my attention Gregory Bateson's text that describes the connections between William Bateson's theories of symmetry and genetics and more recent concepts of feedback, cybernetics, negative entropy, and complexity. See Gregory Bateson, "A Re-examination of Bateson's Rule" in Steps to Art Ecology of Mind (New York, 1972), 379-396.

6. "*This much alone is clear, that the meaning of cases of complex repetition will not be found in the search for an ancestral form, which, itself presenting the same character, may be twisted into the representation of its supposed descendant. Such forms may be, but in finding them the real problem is not even resolved a single stage; for from whence was their repetition derived? The answer to this question can only come in a fuller understanding of the laws of growth and of variations which are as yet merely terms.*" William Bateson, "The Ancestory of the Chordata," in The Scientific Papers of William Bateson, 2 vols. (Cambridge, 1928).

7. Gerry Webster, "William Bateson and the Science of Form," in William Bateson, Materials for the Study of Variation (Cambridge, 1928), xlvii.

8. Sylvia Lenhoff and Howard Lenhoff, Hydra and the Birth of Experimental Biology - 1744: Abraham Trembley's Memoirs Concerning the Natural History of a Type of Freshwater Polyp with Arms Shaped Like Horns (Pacific Grove, Ca., 1986).