

THE QUESTION OF NON STANDARD FORM

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1. This paper is a revised and shortened version of the curatorial essay originally published in French in the exhibition catalogue: Mennan, 2003.

Originally written as a curatorial essay for the international architectural exhibition "Non Standard Architectures" at the Centre Pompidou, Paris (2002-2003), this paper discusses the formal and epistemic implications of the advent of this new paradigm (1). The non standard inscribes itself within the realm of contemporary architectural experimentations making extensive use of recent computational design technologies and its formal catalogue is marked by highly complex dynamic forms that indicate a revival of the organic tradition. The paper recasts this recent organicism in historical continuity with the early modern organic tradition, in order to highlight and reassess this formal tradition resurfacing today. Early modernist and non standard instances of the organic lineage show a remarkable formal reminiscence which conceals however significant epistemological, perceptual, geometric/mathematical and technological distinctions. The paper discusses this reminiscence in terms of a powerful 'gestalt switch' which is both perceptual and epistemic. The modernist mechanic-organic debate is hence revisited in terms of a basic epistemological distinction which invariably associates intelligibility in formal processes with stability and identity, as displayed in typical, standardized forms, while organic formal processes are defined as individualistic, subjectivist, intuitionist processes that escape systematic analysis and rationalization. The debate invariably records a negative anchorage of the organic in modernist thinking, as a counter-modern instrument denouncing mechanic normativity or standardization.

The so-called hermetic formal processes of the organic tradition are becoming increasingly transparent as studies in complexity and computation develop. Organic form is now being rationalized and objectified with an ever increasing computational content, one that is supplied by advances in computer-aided methodologies and procedures used in the development and control of form. The current revival of the organic inserts itself at the very heart of altering logics of material and industrial production which sustain and supply organicist formal



Figure 1. Laszlo Moholy Nagy, *Hand Sculptures*, Institute of Design, Bauhaus New-York, 1940. Moholy Nagy, L. (1947) *Vision in Motion*, Paul Theobald, New York.

processes with technical and material processes of serial but non-identical realization. The formalist methodologies used in computational design research ease the understanding and control of complex forms and enable their production by extending the interface from standardization to non standardization. The organic paradigm is now augmented with a computational essence that adds to the first biological essence of the modernist organic tradition. Indeed, the organic owes its revival to this double essence which reforms its epistemological status and betrays its historiographical obfuscation. In this sense, the non standard is argued to be a first reconciliation of mechanic and organic paradigms, as the neo-organic is now inclusive of the mechanic, and can be sent back into the materiality of serial industrial processes to stand the test where its modern predecessor failed. A growing accuracy to translate form into computational languages now allows for a rigorous discussion of once intuitive topics. Increasingly denaturalized within an increasingly naturalized epistemology, the neo-organic revives intuitionism as a lighter variant of a heavy formalism operative in computational architectures.

INTRODUCTION

The international architectural exhibition “Architectures non standard” (2) has been named after a mathematical analysis (3) and through the bias of multiple external fields into which this latter extends. Indeed, the name indicated the advent of a new paradigm with a double biological and computational essence, one that signals a general and synchronic paradigmatic shift in the theoretical, philosophical, scientific and epistemological accounts of the world in which architecture takes place. This shift is seen to have drastic implications and consequences on architectural form. The formal catalogue of contemporary architectural experimentations within the realm of recent computational design technologies is marked by highly complex dynamic forms which bring back the organic, the dynamic, the animate with renewed interest. Formal stability now submits to an architectural vitalism and ecologism constantly shifting form, caught in ever-developing morphogenetic abilities; the right angle capitulates in a relaxation releasing an open, fluid, adaptive and supple inflection; form explodes, overflows itself in constant variation and change, accomodating and recording data and forces shaping both the environment and itself. This new spatial and formal paradigm expands the visual and plastic repertoire by the production of ever complex *gestalts*, augmented in information content, a thickness which defies the limits of our perceptual and mental abilities, and appeals for a similar augmentation of our faculties.

FORM-NORM

Non standard form is a statement of non-identity extended to the infinite: it forms a powerful challenge to the entire organisation of human experience and philosophical thought, used to be defined between order and chaos, identity and difference, invariable and variable, universal and singular, essence and appearance. Such antinomies are both generated and controlled by an extra-formal normativity that defines form as the incarnation of a model implicated by a norm. The intricate bound between form and norm indicates that a provocative challenge is now being posed to the stability of norm by a formal activity generating singularities that do not retrieve the identity of the model or type; by a shifting definition of essence and origin that refuses a reiteration of similitude; by a denial

2. International exhibition “*Architectures Non Standard*” at the Centre Georges Pompidou, Musée National d’Art Contemporain, Centre de Création Industrielle, December 10th, 2003-March 1st, 2004, Paris, France. Curators: Frédéric Migayrou, Zeynep Mennan.

3. Robinson, 1996. (First publication: Robinson, 1966).

of *telos* that opposes a potential infinite to an actual one. The most significant indication of this changing condition of norm and form is given by developing modes of industrial production that are seen to undergo changes in order to adapt to a rising demand of singularity. What is called customization was a first attempt to deviate the norm, allowing industrial repetition an occasional departure from the model for an accommodation of singularity. The formal variability allowed by customization operates though within the limits of a still bounded norm. In this sense, customization can be defined as a process of 'de-standardisation', to distinguish it from non standardization. Non standardization launches an unprecedented simultaneity of mental and material processes, asking for an adaptation of serial modes of production to altering modes of conception. Developing processes of production - CNC milling machines, rapid prototyping techniques, smart moulds- allow the computation and materialization of any discrete moment of form, in lubricated variation itself with the use of algorithmic systems. This new logic of production enabled by a growing unilaterality of formal/computational languages dissolves the delay between conception and production and has important implications in terms of the relation between form and norm. A new notion of form, defined as simultaneously serial and singular, gives rise to the notion of a fluctuating norm, one which is in constant redefinition in an open-ended series formed by the non-determinacy of a formal catalogue. This new condition that amounts to a synchronic fluctuation of norm and form indicates that the current problematic of the so-called digital architectures lies in an active and pressing reengagement in material and industrial logics of production that redefine formal processes. The exhibition articulated this problematic that displaced the first generation discourse on dematerialization and immaterialization accompanying the advent of the digital, to reorient theoretical and critical interest on new forms of materialization of architecture, repositioned in its current epistemological condition.

IDEALISM-FORMALISM

This condition opens with the growing simultaneity of tools of conception and production drawing closer the traditional epistemic polarity between idealism and formalism. Characterized by a turn towards reality and practicality, away from a-priorisms, this second generation discourse on digital constructivism marks a shift towards a more naturalized epistemology. In mathematics, non standard analysis marks a similar epistemic turn; once inaccessible fields and scales of observation, calculus and proof open with the study of infinitesimals and the advent of computer-aided calculus, and bring forth a more experimental, pseudo-empirical phase for mathematics. This new phase develops a constructive mathematics which opposes pure mathematics and claims scientificity in the articulation of constructed theory and mathematical reality (Harthong and Reeb, 1989). A branch of constructive mathematics, non standard analysis revives intuitionism as a lighter variant of a heavy formalism shifting towards the pragmatism of the techno-sciences (4).

An understanding of the formal implications of the epistemic resolution offered by the non standard requires a return to the idealism-formalism debate which accounts as well for an art-historical unfolding of the problem of form. The problem of form is epistemically and historically inscribed within this debate that centers on the extrinsic-intrinsic dichotomy, that is, the problem of mediation between an external positive

4. Georges Reeb and Jacques Harthong, representatives of the French school of the non standard, refer in "Intuitionnisme 84" to Abraham Robinson's "Formalism 64" paper, comparing his discussion of formalism in 1964 with their discussion of intuitionism in 1984. The text accounts for non substantial differences between the two positions, which are actually the analytic and continental variants of the non standard, the pragmatic use of non standard analysis being more stressed in the former, while the Reeb school focusses on its hermeneutic significance. The title of the paper is also making an implicit allusion to George Orwell's 1984 as a warning against the growing hegemony of formalist ideology. Harthong and Reeb, 1989.

world of contingent things and phenomena, and a mental/intellectual world housing the conceptions and interpretations of the former. This basic philosophical problem is known to stand at the source of the act of creation and operate behind diverse approaches to architectural design. One historical instance of the unresolved oscillation between the two poles of this dichotomy comes as the early modernist indecision between standardization and artistic invention, or typicality and singularity, a modern bipolarization which inscribes itself within the organic-mechanic debate.



Figure 2. Hermann Finsterlin, *Form Study*, 1920.



Figure 3. Frederick Kiesler, *Endless House*, 1950-1959.

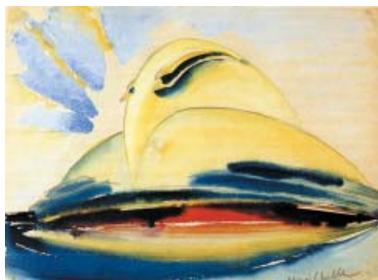


Figure 4. Hans Scharoun *Concert Hall*, watercolor, 1922-1923.



Figure 5. Josef Albers, *Works on Paper*, Bauhaus Vorkurs, 1926, Courtesy of the Bauhaus Dessau Collection.

Figure 6. Antoni Gaudí, *Casa Mila*, detail, Barcelona, 1905-1910.

ORGANIC-MECHANIC

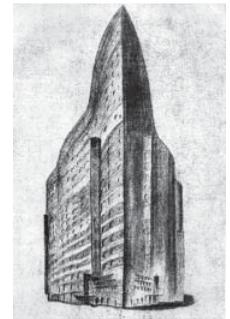
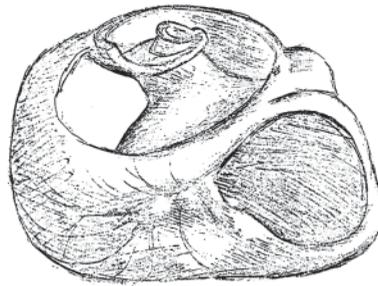
The modernist project of cultural and historical unity brings forth a new normativity resting on a powerful overlapping of artistic, social, economic and political norms made operative with the shifting of emphasis to industrialisation and standardization (Mertins, 2000). Justified by its adequacy to an emerging mass-society, serial production consolidates the prominence of the machinic paradigm in early modernism. Standardization means the self-iterability, stability and perfection of the model/type and norm through mechanical means, a perfection that in the Werkbund ideal of the 'gute form' would also restore to the self-identical product the spiritual effect of the craft object (Mertins, 2000). A simultaneous reading of social, technical and formal norms confers a sense of unity, totality and *Sachlichkeit* to the mechanic paradigm. The organic paradigm, on the other hand, challenges this modernist normativity defined by serial production and typification. Defining an inside-out, open-ended and unpredictable formal process, the organic as an evolutionary metaphor alluding to vitalism and intuitionism resists objectification, producing anxiety all by itself. The organic confronts the disquieting vital element, in mutation and movement, to the morphostasis and identity of typical forms (5). Organic formal processes can not be governed by the normative logic of standardization: Incompatible with serial processes of industrial production, they inevitably fail the test of their serial self-reproduction. With 'mechanization taking command', borrowing the expression of Siegfried Giedion, the organic becomes the term of exclusion of the regulative norm (Gombrich, 1966)(6). The mechanic-organic debate invariably records this negative anchorage of the organic in modernist thinking, as a counter-modern instrument denouncing mechanic normativity.

This incompatibility further extends into a basic epistemological distinction between the mechanic and the organic: while intelligibility in formal processes is invariably associated with stability and identity, as displayed in typical, standardized forms, organic formal processes are defined as individualistic, subjectivist, intuitionist processes that escape systematic analysis and rationalization. The modernist connotation of the organic amounts to a crisis of mastery over the formal process and product, resulting in the banishment of the organic from the realm of the rational and the objective to that of aesthetic psychologism. The mechanic-organic debate then translates into a rational/irrational opposition (Rowe, 1994)(7), one which is less than conclusive in the early decades of the 20th century as witnessed by the intensity of avant-garde debates revolving around the question of form, and the recurring dichotomies between typical and singular, rational and irrational, objective and subjectivist/intuitionist, utilitarian and artistic (Mertins, 2000, 52)(8).

Figure 7. Ernst Kropp, *Seashells*. Kropp, E. (1926) *Wandlung der Form in XX. Jahrhundert*, Reckendorf, coll. "Bücher der Form, Deutsche Werkbund", Berlin.

Figure 8. Le Corbusier, *Sketch*, 1930.

Figure 9. Hugo Häring, *Housing Project for Friedrichstrasse*, Berlin, 1922.



The divide is reflected in the two directions taken by the formalism-idealism debate: on the one hand, a formal/analytic approach which strives to develop a science of form (*Formwissenschaft*), and on the other, an insistent psychologism and intuitionism focusing on the subjective and sensible aspects of aesthetic contemplation (Mallgrave and Ikonomou, 1994). The symmetry is reflected in Wilhelm Worringer's 1907 thesis, *Abstraction and Einfühlung* (Worringer, 1986), attempting without resolution, to bring into equilibrium the two poles of German normative and psychological aesthetics (Valier, 1986). Drawing heavily on Riegl's concept of *Kunstwollen*, this collective and anonymous will to art, abstraction for Worringer arises out of a psychological need to keep distances with an uncontrollable nature, thus opposing 'Einfühlung', this intuitionist sense of well-being and euphoric overlapping with nature (Valier, 1986). Worringer's symmetry is emblematic of the mechanic-organic opposition translated into his abstract and natural forms: abstraction, denoting the inorganic, takes on geometric form and mathematical legitimacy, leaving the organic in an insistent castration in psychologism, maintaining the rational-sensible opposition in which the organic remains hermetic to the disclosure of its formative activity.

EUCLIDIAN-NON-EUCLIDIAN

The opposition is deemed to remain unresolved without the recognition that the so-called abstract and natural forms may not have a common geometric ground. Non-Euclidian geometry, named after its opposition to Euclid's fifth parallel postulate, owed its initial formulations to Gauss, Lobachevsky and Bolyai, as early as in the first decades of the 19th century (Henderson, 1983). Later in 1867, Riemann formulated still another alternative to Euclid's system, a geometry as "the study of manifolds of any number of dimensions and of any curvature, using differential geometry as the measure of this curvature" (Henderson, 1983). The provocative challenge that these alternative non-Euclidian geometries represented was the possibility of surfaces or spaces with variable curvature, on which a figure could not be moved without being affected by changes in its own shape and properties, thus invalidating the Euclidian assumption of the indeformability of figures in movement, in other words, the positing of an absolute unchanging form (Henderson, 1983). The fallibility of Euclid also meant the fallibility of the Kantian a-priori categories of space and time without which perception cannot occur. This first refutation of mathematical axioms would mean a turn from the absolute to the relative nature of truths, as pronounced in Poincaré's conventionalist view of the axioms, stating that geometric axioms are neither synthetic a priori, nor empirical, but conventions (Henderson, 1983). Though not settling the issue, Poincaré's relativism for the first time pointed to the

5. Nikos Salingaros and Terry Mikiten's memetic theory of modernism might be inserted here to account for the degree of exclusion. Defining meme as any idea that endures and propagates, Salingaros and Mikiten explain what they call the unlikely success of modernism by advancing a Darwinian theory of formal selection that would retain only simple and minimalist memes. They introduce further their concept of encapsulation which accounts for the insulation of modernist memes from competing forms and styles, hence assuring their propagation. A negative encapsulation renders itself possible as well, by placing under quarantine the pathological memes that cannot be allowed to link with the successful ones. Salingaros and Mikiten, 2002.

6. Gombrich relates that the term 'barocco' originally referred to the 'sin of deviation' from the classical norm, denoting that which is no-longer classical or degenerate. Gombrich, 1966.

7. Colin Rowe relates how this reference of organic form to subjective licence and individuality sets the elementary dialectic between the mechanic and the organic paradigms. Rowe, 1994.

8. Detlef Mertins notes that architects such as Behrendt, Häring, van de Velde, Van Doesburg, and Mondrian placed an equal emphasis to typicality and singularity, being and becoming, collective and individual. Mertins, 2000.

incommensurability of different geometries in which form takes place, that is, the recognition that the so-called irrational organic forms and rational typical forms develop into philosophically and mathematically different formal and spatial paradigms, explaining also for the aesthetic and epistemological divides that separate them.

VISIBLE-INVISIBLE

The consciousness of this incommensurability would however not bring the idealism-formalism debate to a dead-end. Early 20th century interest in new geometries and in the theory of Relativity opened new conceptions of space and perception with new possibilities of intuiting form and space that allow for an exploration of form in mutation and movement to challenge the identity and stability principles of the mechanic paradigm. However, modern art in the early decades of the 20th century continued to perpetuate the rational/irrational opposition in a diversity of positions taken by the modernist avant-gardes: All these positions were actually different reactions to an 'invisible' which opens with non-Euclidean geometry and the geometry of n-dimensions, with their claims of a curved space and the possibility of a fourth dimension that remain beyond the reach of the visible and of reason (Henderson, 1983). As Linda Dalrymple Henderson (1983) notes, fascination with new geometries, and especially with the fourth dimension was common to almost all avant-gardes (Cubism, Futurism, Suprematism, Constructivism, Dadaism, de Stijl, Surrealism) and was synonymous with emancipation from established truths: The impalpability and versatility of space was either tried to be visualized and measured through the submission of form to empirical, mathematical laws governing the dynamics of its evolution, or met with a denial of intelligibility, turning to pure intuition and pure sensation in an increasingly abstract art liberated from natural references (Henderson, 1983). A rigorous formal/mathematical approach to problems of form would then meet a double resistance in either a para-scientism mystifying the invisible, or a Surrealist and Dadaist relief from reality and materiality (Henderson, 1983). The mystification of mathematical and scientific developments in early 20th century (in the form of pseudo-philosophical movements such as Hinton's Hyperspace Philosophy and Theosophy, or the popularization of the fourth dimension in science-fiction novels (9)) account for a resistance to a formalization that can not yet be redeemed by existing mental and cognitive structures and for the same reason overflows intelligibility. It can be noted that this condition echoed itself in the proliferation of the literature of cyberspace and virtual reality, in the frenetic emphasis on the dematerialization of the visible and the tangible in invisible bits.

This distrust in visual reality was however balanced with an interest in visualization. A proponent of what he calls "the mathematical way of thinking in visual art", Max Bill (1993) points to the necessity of "the assistance of some visualizing agency" so that "...abstract conceptions assume concrete and visible shape, and so become perceptible to our emotions. Unknown fields of space, almost unimaginable hypotheses, are boldly bodied forth" (Bill, 1993, 8). An enlargement of the visual template, already apparent in the 19th century practice of modelling mathematical objects and the artistic interest in them, would contribute to the formation of a plastic language and provide for new formal idioms. Interest here is less in formalism than in "form in which intuitions or ideas or conjectures have taken visible substance...an image that is no mere transcript of this

9. See Abbott, E. A. (1992) *Flatland: A Romance of Many Dimensions*, Dover, New York.

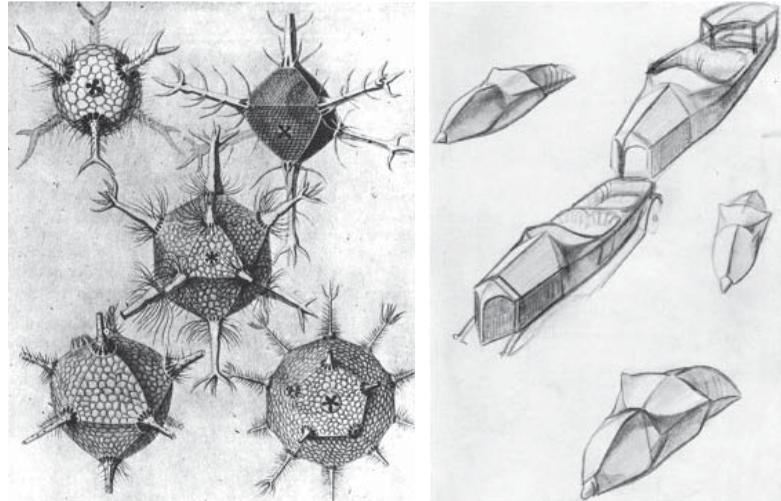


Figure 10. Ernst Haeckel, *Skeletons of various Radiolarians*, 1899. Thompson, D' A. W. (1992) *On Growth and Form*, Dover Publications, New York.

Figure 11. Ernst Kropp, *Sketch*. Kropp, E. (1926) *Wandlung der Form in XX. Jahrhundert*, Reckendorf, coll. "Bücher der Form, Deutsche Werkbund", Berlin.

10. Henderson notes that Gauss and Lobachevsky turned to the observation of mountains or distant stars, to test their new geometries against higher scales of physical space to determine whether space had a non-Euclidian curvature that has not been apparent enough to affect the formulation of Euclid's system. Henderson, 1983.

invisible world but a systematization of it ideographically conveyed to our senses" (Bill, 1993, 9). This will to visualization, as a demystifying endeavour to map what remains beyond the scale of vision (10) is fulfilled for instance in the case of fractal geometry, developed in the 1970's by Benoit Mandelbrot, depicting the geometry of nature in the figure of the fractal enlarging the domain of the visible to at once inaccessible scales of observation and with an accuracy that would not have been conceivable without the help of the computer (Mandelbrot, 1993). The limits of the visible extend with the limits of computation and reason.

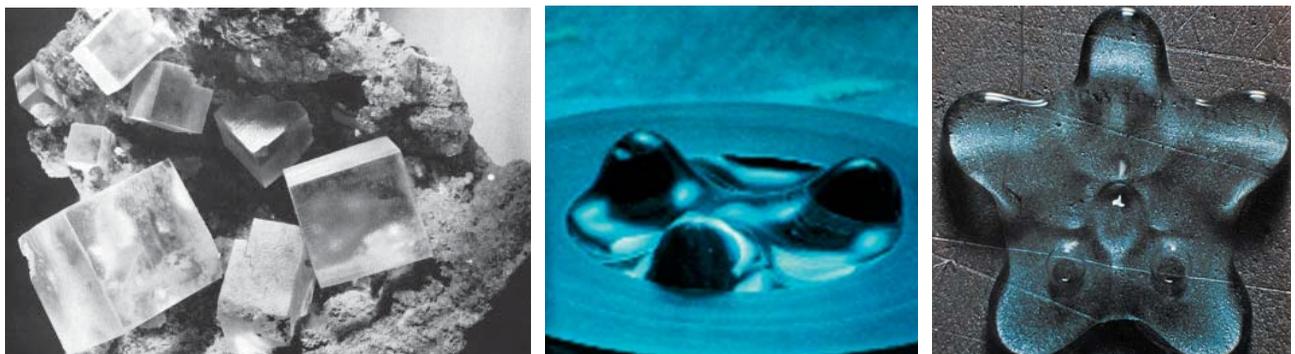
DETERMINISM-INDETERMINISM

However, the insufficiency of mathematical tools and topological-geometric models was still an obstacle in 1917 when D'Arcy Thompson wrote his major treatise *On Growth and Form*, developing a morphogenetic theory repositioning the problem of form as a mathematical problem and that of growth as a physical one (Thompson, 1992). D'Arcy Thompson extends his treatment of form as number to both animate and inanimate forms that are claimed to obey the same mathematical laws derived from the precise model, the latent logos of nature (Mazzocut-Mis, 1995). The claim that a common typological and determinist drive underlies the invariable laws generating form, whether inert or animate, not only denies a special status to the living, but also affirms the possibility of subordinating the irreducible organic to a computable and determinable behaviour. According to D'Arcy Thompson, the only obstacle in reducing

Figure 12. Max Bill, "The perfect cube exists in Nature". Bill, M. (1952) *Form*, Karl Werner, Basel.

Figure 13. Hans Jenny, *Vibrational Effects in a Liquid*. Jenny, H. (1974) *Cymatics: Wave Phenomena, Vibrational Effects, Harmonic Oscillations with their structures, Kinetics and Dynamics*, v: 2, Basilius Press, Basel.

Figure 14. Hans Jenny, *Vibration of a Waterdrop*. Jenny, H. (1974) *Cymatics: Wave Phenomena, Vibrational Effects, Harmonic Oscillations with their structures, Kinetics and Dynamics*, v: 2, Basilius Press, Basel.



11. The theory of Catastrophes (René Thom), the theory of fractals (Benoit Mandelbrot), the theory of dissipative structures (Ilya Prigogine), Chaos theory (David Ruelle), or cynergetics (Hermann Haken). Boutot, 1993.

12. See Harthong, J. (1992) *Le Continu et le Discret, un Problème Indécidable, Le labyrinthe du Continu*, Proceedings of the Cerisy colloquium, eds. J-M. Salanskis, H. Sinacoeur, Springer-Verlag, Paris.

the complexity of natural forms into a mathematical intelligibility would be the lack of quantitative measures and deficiencies in mathematical and physical methodologies, and not an irreducible residue in the vital element (Mazzocut-Mis, 1995). This remarkable formalization of the organic went largely unheard in the early modern artistic and architectural practices redeeming the new geometries as new plastic opportunities revealed only through the intuitions of the artist. D'Arcy Thompson's work was however a precursor of studies in differential growth, that have been extended by contemporary theories of complexity. Overcoming the obstacles faced by D'Arcy Thompson's reductionist enterprise, studies in complexity sciences ironically oppose his reductionism to develop a phenomenological hermeneutics of form.

The study of forms having unpredictable dynamic behaviour is given impetus in complexity sciences, gathering diverse morphological theories (11) which account for the radicalisation of a new formal, geometric and computational paradigm, by placing the study of form on an empirical continuum of spatio-temporal data within which form presents an infinite variety: Alain Boutot (1993) notes that this elimination of discontinuity, of the discrete, disposes of tools of differential and integral calculus invented in the 17th century but remained ignored as some kind of limit case to continuity itself, together with some branches of mathematics, such as topology. Complexity theories offer new insights into the continuity-discontinuity problematic (12) which projects itself into the question of formal processes governing stable and dynamic forms, hence the divide between typical and organic forms. The theory of Catastrophes, for instance, suggests a doubling of space; a substrate space of empirical observation and an ideal mathematical space of parametrization of the qualitative properties of the substrate space at any of its points (Boutot, 1993, 82). Continuity is a feature of the ideal space, in which the dynamic at the origin of morphology is played out, whereas the morphology itself occurs as a discontinuity in the substrate space. The ideal space of mathematical *logoi* determines form which is engendered through projection on the substrate, where empirical morphologies appear as traces of an abstract superstructure (Boutot, 1993, 82). An apparent neo-Platonism in this projection of the intelligible on the sensible does not allow however for a revival of idealism, one that has been weakened with what Boutot calls an "ontological neutrality", a common attribute of all morphological theories which refuse to pronounce themselves on the essence of being (Boutot, 1993, 83). This ontological indifference to the nature of the substrate of forms is affirmative of the autonomy of form from the abstract space of control parameters. Form refuses its self-determination and self-prediction despite an augmentation of accuracy in the control of parameters, augmenting also predictive capabilities. Indeed, determinism is inhibited in the case of complex systems which are unstable, dynamic and open systems constantly exchanging information, energy or matter with the environment. That is why, though remaining under the spell of classification in their search for common, simple, iterative rules in the generation of complex form, these theories do not strive to derive ideal invariables out of empirical morphologies, but instead develop a new language for deciphering and rationalizing forms in motion (Boutot, 1993). Modelling inner logic rather than external form, complexity sciences provide insights into the ways organic forms evolve in constant relation with dynamic and variable influences from their context. They mark the shifting interface between the hermetic and intelligible aspects of organic formal processes.

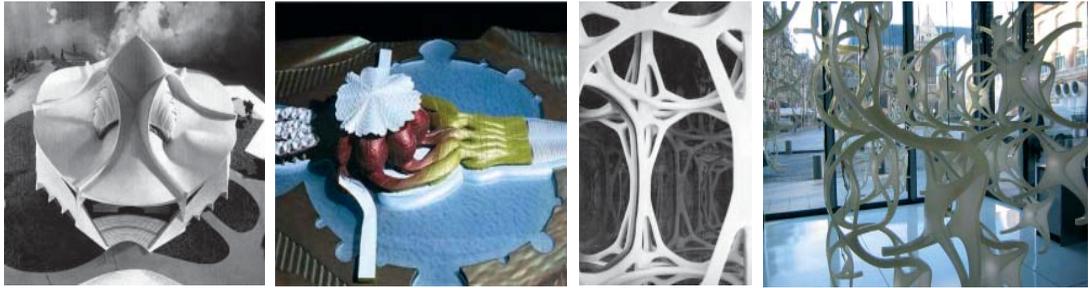


Figure 15. Enrico Castiglioni, *Syracuse Basilica*, 1957.

Figure 16. Greg Lynn, *Form, Ark of the World Museum*, 2002-2006.

Figure 17. Frei Otto, *Space Frames*, 1962.

Figure 18. Servo, *Lattice Archipelogs*, 2002.

Figure 19. Konrad Wachsmann, *Structure Study*, 1955.

Figure 20. R&Sie, *Wireframe*, 2002.

Figure 21. Kisho Kurokawa, *Helicoidal City*, 1961.

Figure 22. Kovac Architecture, *World Trade Center*, 2002.



BIOLOGICAL-COMPUTATIONAL

The resurfacing of the organic in non standard architectures is therefore not a mere formal revival. The organic paradigm is now augmented with a computational essence that adds to the first biological essence of the modernist organic tradition. Indeed, the organic owes its revival to this double essence which reforms its epistemological status and betrays its historiographical obfuscation during modernism. The non standard redemption of the organic accounts then for a powerful 'gestalt switch', simultaneously perceptual and epistemic (13).

Early modernist and non standard instances of the organic lineage show a remarkable formal reminiscence which conceals however significant epistemological, perceptual, geometric/mathematical and technological distinctions. This return of the organic in a differentiated form suggests an extending non complete form-class, the historical reading of which would be obscured by a stylistic and normative classification of forms. George Kubler in *The Shape of Time: Remarks on the History of Things* (1962) brings forth a theory of formal sequences which allows for a simultaneously historical and formal reading. A sequence suggesting an open-ended expanding class, the biological analogy of style (birth, maturity and death) is replaced here by the mathematical analogy of topology which allows historical segmentations for elastic expansion and releases them from the fixity of style (Kubler, 1962). The biological analogy in Kubler's theory is speciation, where form is manifested by a large number of individuals undergoing genetic changes (Kubler, 1962, 34). Stressing the indeterminacy of the beginning and end of formal sequences, Kubler notes that some formal sequences may remain inactive for long periods, but be reactivated when the problem is given greater scope by new needs: thus "abortive, retarded or stunted sequences" can be boosted under new conditions, especially in the case of renewal in craft techniques or technological innovations (Kubler, 1962, 48). Carefully avoiding stylistic categorization, Kubler refers only to early and late solutions, differentiating the early 'promorphs', "technically simple, energetically inexpensive, and expressively clear", from the late 'neo-morphs' that are "costly, difficult, intricate, recondite and animated" (Kubler, 1962, 55). Following Kubler (1962), the organic tradition can be reformulated as a formal sequence that has been retarded in the art-historical construction of modernism, and waiting for technological, scientific, epistemological and aesthetic paradigm changes

13. The term 'gestalt switch' is used both in its original sense, as developed by gestalt psychologists to define perception changes occurring on the same object, and in the much debated connotation it retains in the philosophy of science, first developed by Wittgenstein in his duck-rabbit switch discussion in *Philosophical Investigations* (1952), and further by Thomas Kuhn in *The Structure of Scientific Revolutions* (1970) to account for switches between paradigms.

for its reactivation in non standard neo-morphic solutions. The visual genealogy presented in the exhibition and the catalogue (Migayrou and Mennan, 2003) correspond to pro-morphic solutions of this once hindered sequence.

CONCLUSION

The historical unfolding of this form-class opens a multi-faceted philosophical, epistemological, and geometrical debate on form, linking to problems of perception, gestalt, cognition and computation. The 'gestalt switch' we are experiencing through the ontogenesis of the organic accounts for paradigm changes developing around three axis; an epistemic axis of determinism-non determinism, a geometric axis of discontinuity-continuity, and a perceptual axis of simplicity-complexity, where the shift from one pole to the other is increasingly yielding the organic towards rationalization, de-ontologization and denaturalization. The perceptual 'gestalt switch' we are experiencing between the early and the late forms of the organic is then also a consciousness of their incommensurability. The hermetic formal processes of the organic tradition are becoming increasingly transparent as studies in complexity and computation develop. Organic form, which used to escape definition as intelligible structure, is being rationalized and objectified with an ever increasing computational content, one that is supplied by advances in computer-aided methodologies and procedures used in the development and control of form. The organic is increasingly denaturalized within an increasingly naturalized epistemology offering an epistemic resolution to the rational-irrational dialectic historically framing the mechanic-organic debate. This resolution is itself intricately bound to developments in computational sciences and the industrial production interface. The formalist methodologies used in computational design research ease the understanding and control of complex forms and enable their production by extending the interface from standardization to non standardization. The advent of a non standard regime of industrialization imposes a radical disruption in terms of modernist normativity and addresses a provocative challenge to modernist standardization. In this sense, the non standard also prepares for a reversal of mechanic and organic paradigms. Non-standardization legitimates the singular, as standardization legitimated the typical. The current revival of the organic inserts itself at the very heart of altering logics of material and industrial production which sustain and supply organicist formal processes with technical and material processes of serial but non-identical realization. This is a first reconciliation of mechanic and organic paradigms (14), as the neo-organic is now inclusive of the mechanic, and can be sent back into the materiality of serial industrial processes to stand the test where its modern predecessor failed.

We can then think of an anachronism in the case of early organicism with respect to current processes of formalization. Prior to contemporary studies in complexity and computation, and in the absence of formalization, early organic processes could not withstand the modernist demands for rationalization nor serial production. Early organicism then necessarily constructed intermediary metaphysical structures or a pseudo-scientism compensating for this anachronism. Form now recovers from the ontological delay of idealist conceptions, approaches the intelligible through a flattening of ontological strata. Translation delays between conception and production are overcome with the help of a growing

14. Detlef Mertins refers to the concept of 'gestaltung', "added to the arsenal of Modernist polemics" by the 1920's, as the organicist metaphor of form in open-ended evolution attempting to reconcile the mechanic and the organic, but one that still kept transcendental residues in its reference to the mysterious origins of creativity. Mertins, 2000.

15. The epistemic position of complexity sciences offers an intriguing synthesis between positivist and phenomenological approaches, much in the same way as Gestalt theory positioned itself at the crossroads of logical positivism and phenomenology. Gestalt theory represented an important step away from the mystical intuitionism of 19th century, exploiting the mind with the aid of the developing science of experimental psychology. The original essay (Mennan, 2003) contains a discussion of the intuitionist approach in the realm of perception in order to deal with a complex form displayed in a continuously inflecting space. A reconsideration of Gestalt theory is suggested for an understanding of the perceptual organisation of complexity. For an experimental design research problematizing the premises of Gestalt theory within the context of the complexity paradigm see Mennan, Z. (2006) Questioning Graphic Rationality in Architecture: Experimentations on the visual and the non-visual, *Architectural Education Forum 3: Global Architectural Education Area GA EA* (15-17 November 2006), Association for Architectural Education Arch-Ed, İstanbul Technical University, İstanbul.

accuracy to translate form into computational languages which allow for a rigorous discussion of once intuitive topics.

The question of non standard form is seen to leave the idealism-formalism impasse to reinscribe itself in an intuitionism-formalism debate, where intuitionism and formalism no more oppose each other. The current status of (organic) form within this debate needs yet to be defined. On the one hand, a process of continuous formalization claims for an overall objectification and an almost impudent denudation of cognitive and spiritual processes, of the mysteries of the mind. The black box acquires transparency in a formal language dreaming ultimately of replacing human intelligibility and rationality with artificial intelligence, an overarching deterministic endeavour occupying an immutable place in architectural history. From ancient treatises and pattern books to the design methodology movement of the sixties, the pragmatism of a problem-solving approach invariably disciplined architectural activity, grounding it in foundational forms that are produced through laws and norms expected to free the formal activity from the vagaries of the designer. Prescriptive approaches to design and form-making can now be fulfilled within the formalism of computational languages. On the other hand, the positivism and pragmatism of this heavy formalism confronts the intuitionism of contemporary theories of complexity which radically oppose the analytical-reductionism of the techno-sciences and its determinism (15). Developing a formal hermeneutics disinterested both in a-priorism and a-posteriorism, theories of complexity can be said to align with the epistemic position of non standard mathematics, its constructive, intuitionist method denouncing formalism as ideology while retaining it as method (Harthong and Reeb, 1989). In mathematics, systems extending incomplete systems are generally called non standard systems. This consciousness of incompleteness seems to be the most important contribution of the non standard; it is secured by an irreducible intuitionism against the exhaustive attempts of an overarching formalism.

This intuitionism is now seen to be different from its counterpart in the realm of aesthetics. Drained of its mystical and subjectivist references, non standard intuitionism comes as a lighter variant of formalism, one which cultivates our abilities to tolerate indeterminism and incompleteness, that are inherent qualities of non standard forms. Non standard intuitionism ensures a never-completed space of creativity and non-identical reproduction, releasing an infinity of possibilities suggested in the plural of non standard architectures.

BIBLIOGRAPHY

- BOUTOT, A. (1993) *L'Invention des Formes*, Editions Odile Jacob, Paris.
- BILL, M. (1993) The Mathematical Way of Thinking in the Visual Art of our Time, *The Visual Mind: Art and Mathematics*, ed. by M. Emmer, The MIT Press, Cambridge, Massachusetts; 5-9.
- EMMER, M., ed. (1993) *The Visual Mind: Art and Mathematics*, MIT Press, Cambridge, Massachusetts.
- GOMBRICH, E.H. (1966) *Norm and Form: Studies in the Art of the Renaissance*, Phaidon Press, London.
- HARTHONG, J., REEB, G. (1989) Intuitionnisme 84, *La Mathématique non Standard; Histoire, Philosophie, Dossier scientifique*, eds. H. Barreau,

- J. Harthong J., Editions du CNRS, Paris. Available from: <http://moire4.u-strasbg.fr/souv/Int84.htm>. [Accessed: 15 June 2003]
- HENDERSON, D. L. (1983) *The Fourth Dimension and Non-Euclidean Geometry in Modern Art*, Princeton University Press, Princeton, NJ.
- KUBLER, G. (1962) *The Shape of Time: Remarks on the History of Things*, Yale University Press, New Haven and London.
- MALLGRAVE, H. F., IKONOMOU, E. (1994) Introduction, *Empathy, Form and Space : Problems in German Aesthetics, 1873-1893*, eds. J. Bloomfield, T. F. Reese, S. Settis, The Getty Center for the History of Art and Humanities, Santa Monica, CA; 1-88.
- MANDELBROT, B. (1993) Fractals and an Art for the Sake of Science, *The Visual Mind: Art and Mathematics*, ed. M. Emmer, The MIT Press, Cambridge, Massachusetts; 11-14.
- MAZZOCUT-MIS, M. (1995) D'Arcy Thompson, la Forme et le Vivant, *Alliage* (22) Available from: <http://www.tribunes.com/tribune/alliage/22/mazz.htm> [Accessed: 18 June 2003]
- MIGAYROU, F., MENNAN, Z. eds. (2003) *Architectures Non Standard*, Editions du Centre Pompidou, Paris.
- MENNAN, Z. (2003) Des Formes Non Standard: Un 'Gestalt Switch', *Architectures Non Standard*, eds. F. Migayrou, Z. Mennan, Editions du Centre Pompidou, Paris; 34-41.
- MERTINS, D. (2000) Introduction, *The Victory of the New Building Style*, W. K. Behrendt, trans. H. F. Mallgrave, Getty Research Institute, Los Angeles, CA; 1-84.
- ROBINSON, A. (1996) *Non Standard Analysis*, Princeton University Press, New York. (First publication: ROBINSON, A. (1966) *Non Standard Analysis: Studies in the Logic and Foundations of Mathematics*, North Holland Inc., Amsterdam)
- ROWE, C. (1994) *The Architecture of Good Intentions: Towards a Possible Retrospect*, Academy Editions, London.
- SALINGAROS, N. A., MIKITEN, T. M. (2002) Darwinian Processes and Memes in Architecture: A Memetic Theory of Modernism, *Journal of Memetics - Evolutionary Models of Information Transmission* (6). Available from: http://www.cpm.mmu.ac.uk/jomemit/2002/vol6/salingaros_na&mikiten_tm.html [Accessed: 20 July 2003]
- THOMPSON, D'A. W. (1992) *On Growth and Form*, Dover Publications, New York.
- VALIER, D. (1986) Presentation, *Abstraction et Einfühlung: Contribution à la Psychologie du Style*, W. Worringer, Editions Klincksieck; Paris.
- WORRINGER, W. (1986) *Abstraction et Einfühlung: Contribution à la Psychologie du Style*, Editions Klincksieck, Paris.

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Anahtar Sözcükler: standart olmayan; organik; biçimsel süreçler; formalizm (biçimcilik); sezgisellik.

STANDART OLMAYAN FORM SORUNU

İlk olarak 2002 yılında Paris, Centre Pompidou'da açılan "Standart Olmayan Mimarlıklar" uluslararası mimarlık sergisinin kataloğu için hazırlanan bu makale, serginin sunduğu ve tanımladığı bu yeni paradigmanın biçimsel ve bilgi-kuramsal etki ve uzantılarını tartışmaktadır. Yeni sayısal tasarım teknolojilerini yoğun olarak kullanan çağdaş deneysel mimarlık araştırmalarını tanımlayan "standart olmayan" mimari üretimin biçim kataloğu yüksek derecede karmaşık ve hareketli biçimler içermektedir. Makalede bu biçimsel kataloğun, organik geleneğin bir yeniden uyanışını işaret ettiği savlanmakta ve tekrar canlandığı gözlenen bu biçimsel geleneğin, erken modern organik gelenek ile tarihsel süreklilik içinde ele alınarak öne çıkartılması ve değerlendirilmesi amaçlanmaktadır. Organik biçimin erken modern ve "standart olmayan" örnekleri kayda değer biçimsel benzerlikler içerseler de, bu akrabalığın önemli bilgikuramsal, algısal, geometrik/matematik ve teknolojik farklılıkları sakladığı önerilmekte ve bu benzerlik, hem algısal, hem bilgikuramsal olarak deneyimlenen güçlü bir 'gestalt çevrimi' olarak tartışılmaktadır. Bu bağlamda, modernist mekanik-organik tartışması da ortaya koyduğu temel bir bilgikuramsal ayrım açısından yeniden ele alınmaktadır; bu temel ayrım, biçimsel süreçlerde akılcılığı ve anlaşılabilirliği devamlı olarak biçimin kararlılığı ve tekrarlanabilirliği üzerinden kaydedip tipik ve standart biçimlere bağlarken, organik süreçleri, sistematik ve akılcı analize direnen bireysel, öznel ve sezgisel süreçler olarak tanımlar. Böylelikle 'organik', modernist düşünceye, mekanik normların ve standardizasyonun aleyhinde bir karşı modern araç olarak yerleştirilir.

Organik geleneğin anlaşılması zor ve kapalı biçimsel süreçleri, karmaşıklık bilimleri ve bilişsel bilimlerdeki gelişmelerle birlikte giderek saydamlaşmaktadır. Organik biçim bugün biçimin geliştirilmesinde ve denetiminde kullanılan bilgisayar destekli yöntem ve işlemlerin desteklediği artan bir hesapsal içerik ile akılcı ve nesnel kavramaya giderek daha açık hale gelmektedir. Sayısal tasarım araştırmasında kullanılan formalist yöntemler karmaşık biçimlerin anlaşılmasını ve denetimini kolaylaştırırken, endüstriyel arayüzün standardizasyon'dan "non-standardizasyon"a kayması ile bu biçimlerin seri üretimi de sağlanabilmektedir. Organik geleneğin yeniden canlanması da, değişmekte olan materyel ve endüstriyel üretim mantığının bugün organik biçimsel süreçlerin 'seri ama aynı-olmayan' yeniden üretimine teknik ve materyel destek verebilir hale gelmesine bağlıdır. Bu yeni organik paradigma, modernist organik geleneğin ilk biyolojik özüne eklenen hesaba dayalı bir ikinci öz ile artırılmış olarak karşımıza çıkar. Aslında, bu çifte öz, organığın bilgikuramsal statüsünü yeniden tanımlarken, tarihsel ihmalini de haksız çıkarır. Bu anlamda, "standart olmayan"ın mekanik ve organik paradigmaların ilk uzlaşması olduğu iddia edilmektedir, çünkü yeni organik artık mekaniği de içermekte ve modern sefelinin aksine seri üretim testinden geçebilmektedir. Biçimin sayısal dillere giderek artan bir doğruluk ve kesinlikte çevrilebilmesi ile önceden sezgisel ve muğlak olan konuların tartışması da artık kesinlik kazanmaktadır. Giderek doğallaşan bir bilgi kuramı içinde giderek doğallığını kaybeden yeni organik, sezgiselliği, sayısal mimarlık üretiminde etkin olan ağır formalizmin daha hafif bir çeşidi olarak yeniden tanımlar.