

The role of material in the generation of form is one of the most vividly discussed issues of modern architecture. While material for Gottfried Semper was one of the major factors that influence style, the Viennese art historian Alois Riegl rejected this position in his 1901 book *Spätromische Kunstindustrie*: "In contrast to this [Semper's – Á. M.] mechanistic concept of the essence of the work of art, I argued in *Stilfragen* ... for a teleological theory, regarding the work of art as a result of concrete and purposeful *Kunstwollen* (artistic will), that asserts itself in a struggle with the purpose, the material, and the technology. Therefore, these last three factors no longer assume the positive creative role attributed to them by the Semperian theory, but rather a restraining and negative one: they form, so to speak, the coefficients of friction within the resulting product."<sup>1</sup> Today, architects such as Rem Koolhaas, Peter Eisenman and Greg Lynn speak of the generic form as the result of a dynamic process that unfolds over time. This process is global in character, but can respond to specific local needs such as pressures of economy. The final form is a frozen moment of a temporal form-generating process, made possible by the use of the computer. Greg Lynn points out that his projects are based on so-called "sweeps", quasi-organic periods, that have their moments of fertilization and growth. "There is no instancing of form but rather the distribution of elements on sequential patterns according to speeds, accelerations, decays, and trajectories."<sup>2</sup>

Such strategies of design have their consequences in the production process, no matter whether the actual product is a building, a computer case or a toothbrush. The manufacturing of car body parts or of laminated timber frames for buildings shows the enormous difference between Modernist ideas of mass production and the recent situation. By the time that the Ford factory had to change the famous T Model – after the production of some fifteen million cars of this type – their technology had become so specialized that the changeover brought extreme problems.<sup>3</sup> The machines were built for manufacturing exactly defined elements. Today, they can be programmed to produce a wide spectrum of different car body or engine components.

This new flexibility of production transforms our thinking about materials. We associate forms generated this way with metals such as titanium that can be used to wrap the fluid body of the building. But the increasing elasticity of the manufacturing effects traditional materials as well. The Swiss architects Valentin Bearth and Andrea Deplazes use laminated wood constructions that are prefabricated, but not catalogue products. The computer-controlled robots can cut and laminate frames in various shapes and spans; if necessary, each and every frame can be different from the other. Bricks, similarly, can be produced in any size, according to the specification of the architect. Did materials lose their "coefficients of

friction", their specific resistance, that was part of their "morality"? The German architect Fritz Schumacher, who shaped the city of Hamburg not only with his urban projects but also with a large number of brick structures, was convinced that it is this specific resistance of the brick to capricious ideas that makes it to the building stone of the modern metropolis. It is easy to trace such ideas back to Ruskin's and Pugin's writings about truth to materials.

The notions of material truth and of iconographical meaning that materials carry are rejected by many architects today. Caroline Bos notes: "Perhaps ours is the first generation for whom material and meaning are completely and effortlessly disconnected."<sup>4</sup> The Swiss architect Christian Sumi is even more emphatic, rejecting the "entire prudish Modernist machinery of legitimization", that is stuck "in the moralistic swamp of so-called 'truth in materials'." By using hybrid products such as concrete panels with wood fibers, he tries to "demont the 'truth of materials'."<sup>5</sup> What he claims is the end of one of the grand narratives, the end of "natural" identity, and the emergence of a world of smooth surfaces.

The surface of an object is a microscopic layer that has to fulfill certain demands that are different from the ones that the inner parts are facing. This thin outside skin has to withstand a lot of abrasive forces, from acid rain to frost and heat. At the same



1 | Valentin Bearth, Andrea Deplazes, Haus Willimann, Sevgein

time, this "frontline" layer of the object is the one that the user confronts: looks at it, smells it and touches it. Therefore its sensorial qualities influence the acceptance of the product. Understandably, along with direct perceptions of the feel and look of the object, its cultural meaning also greatly depends on the appearance of its surface.

The surface is therefore not just the boundary where the object ends, but an active interface between "inside" and "outside", that regulates the exchange of flows (energy, air, light, information, etc.) between the two realms. It is like an osmotic membrane that is able to control essential processes and is therefore a major determining factor regarding the identity of the object.

Because the requirements vis-à-vis the surface are radically different from those that the internal layers have to fulfill, there can be no coherence between them. The epidermis does not reveal much about the tissues that it wraps, which might explain why the old moral imperative of "truth to materials" can not convince, at least not in the form how architects of Modernism understood it.

The cultural dimension of the physical quality and the appearance of the skin becomes apparent if we consider the issue of weathering and aging. In Riegl's concept of the "Alterswert" (age value), certain atmospheric and historical values were attached to surfaces that show the passing of time, while today agelessness or eternal newness is the ideal that determine the choice of surface materials. Smoothness appears desirable, since it offers nothing which the sediments of time could settle on – or at least it seems so.

"Coefficients of friction", however, are not just material surfaces that are rough in a physical sense, offering themselves to weathering, but also which accumulate layers of meaning – and those can not be blasted away easily. From the point of view of globalization, the internationalization, that is, the denationalization and de-territorialization of materials, their cleansing of local meaning appears to be a prerequisite of their universal transferability. Saskia Sassen speaks of the "dematerialization" of "entities, goods, and processes" as the "concrete outcome of the interaction of new technological capacities and the will to new forms of power".<sup>6</sup> Similar points has been raised earlier in the exhibition "Les Immateriels" organized by Jean-François Lyotard at the cci in Paris, in 1985: material disappears as an independent entity, as a "substance" with a particular identity, and the interaction becomes emphasized. "At the end, one can only speak about effect and no longer about glass itself. It is a matter of the degree of transparency, of cast of shadow, or of reflection. This is perhaps the decisive moment, the impulse away from materials to those materials, effect. By effect, I mean unmediated effect, uncorseted by semantics" – explains Christian Sumi.<sup>7</sup>

Speaking about the façade renovation of the Triemli Hospital in Zurich, he adds: "We were not, as Gehry may have been, interested in the semantic aspect. (...) The Gestalt-psychological effect was important to us, not chainlink per se. The question was, how one can use chainlink so that its referential character is erased."<sup>8</sup>

But is it possible at all to erase the "referential character of materials" such as chainlink? In the earlier work of Frank Gehry, corrugated metal sheets and chainlink fences were signs of the suburban environment in Los Angeles, and it is hard to imagine that the transfer of such materials to Singapore or Spain would actually require the erasure of the "referential character". The myth of Los Angeles became by now part of a global culture, and it is the myth that reproduces the aura surrounding building materials. In the recent work of Gehry, the metal skin seems to follow the fluid form effortlessly. Titanium allows for an extremely thin sheet that is still durable. This durability, without the monumental-tectonic, Vitruvian implications of "firmitas", is a new development in architecture. However, other examples of recent architecture show a return to narratives.

Bergamot Station in Santa Monica is a complex containing some of the most fashionable and expensive art galleries of the the Los Angeles area. They



2 | Frank Gehry, Santa Monica Place, Santa Monica



3 | Bergamot Station Arts Centre, Santa Monica

are housed in former warehouse buildings; the weathered appearance of corrugated metal with layers of old paint peeling off has been carefully maintained, very much in the sense of Riegl's cult of the "Alterswert". The House of Blues in Hollywood is a newly built structure enshrined with corrugated tin plates that were brought here from the legendary crossroads of Highway 61 and 49 outside Clarksdale, Mississippi – where Delta blues master Robert Johnson sold his soul to Satan in exchange for musical talent.

One could examine the materials used in recent architecture and we would come to similar conclusions. Even in cases where an attempt is being made to focus on primary perceptive qualities of the surface and suppress differences in materiality – like, for instance, Sumi and Burkhalter in the case of the Zürichberg Hotel – the observer reads the exterior as a Semperian interpretation of the textile origins of the façade.

The cultural construction of the identity of materials allows for multiple layers of meanings. This can be demonstrated by Aalto's use of brick as a material of "flexible standardization". The construction of the identity of brick as a building material is a process fluctuating between the poles of sentimental and technological responses to questions of the given period. Brick is sentimental as a sign for earth and

fire, for the touch of the hand, even if the actual brick in question is a modern industrial product. Wallpapers imitating brick masonry demonstrate that this "nostalgic" significance of the brick is very much alive.

Brick, again, is technological as the result of early standardization, as the document and prerequisite of mass production of houses and as a factory-made product itself – even if the coordination of its size with the grid of the measuring system never quite succeeded. Paradigm changes within the Modern Movement are reflected in the statements and theories surrounding the use of brick.

Sigfried Giedion gave the new Aalto-chapter of the eighth edition of his *Space, Time and Architecture* (1949) the sub-title "Irrationality and Standardization", and claimed that "the combination of standardization with irrationality" is intended to fulfill the moral imperative of the avantgarde, that is, "to reestablish a union between life and architecture." The undulating wall became a leitmotiv not only in Aalto's oeuvre, connecting Finnish lakes with glass vases, exhibition spaces and the MIT dormitory, but also in the context of *Space, Time and Architecture*, where it continues what Giedion described as a "tradition" that started with Borromini's façade of the San Carlo alle Quattro Fontane and the Crescents of Bath. Irrationality now takes the place of transparency and other terms of the space/time synthesis, as the new epitome of the program of humanizing architecture.

Brick was for generations of architects not only the source of endless fascination, but presented them with some problems both as a stereometrical volume and as a material object. The names by which bricks were referred to tied them to certain places, to sorts of clay and fuel; color, surface and the size of the brick varied accordingly, which was a serious obstacle on the way toward standardization. Efforts to establish a norm even in one country reflected the political interests of the moment; the Austrian discussion, for instance, focused on the issue whether the Austrian brick building tradition is more closely tied to Lombardy or to Southern Germany. Modernization required the deterritorialization of the brick by introducing national and international standards in terms of its size or weight, but still, it was impossible to erase the associations with the "brick regions".

Aalto, in his lecture *Art and Technology* (1955), emphasized the localness of the brick: "An ordinary brick is for all appearances a primitive product, but if it is made correctly, properly processed from the country's own raw materials, if it is used in the right way and given its proper place in the whole, then it constitutes the basic element: in mankind's most valuable and visible monuments and is also the basic element in the environment that creates social well-being."<sup>9</sup> That means, the brick must occupy its prop-



4 | Marianne Burkhalter, Christian Sumi, Hotel Zürichberg, Zürich



er place as a basic element not only in a given structure, but also in the equation of needs, the society and its culture. Processing the bricks means giving amorphous clay a clear geometric body and a durability; creating an individual that has to play its own well-defined role within a structure.

Architecture in ancient time meant the correct combination of nature's materials, emphasized Aalto in an earlier talk, held in 1938 at the Nordic Building Conference in Oslo. "This primitive art arouses in us a curious kind of admiration, since here one can recognize most clearly the first modest victories of the human intellect over nature."<sup>10</sup> Brick is the first product of this intellect, "an expression of human intellectuality based on 'materia' ... I think of the word 'materia' in a broader sense in which the purely material activity is closely connected with an intellectual process."<sup>11</sup>

Aalto's Oslo talk on *The Influence of Construction and Material on Modern Architecture*, demonstrated his concern about the issue of "true standardization", that was very different from what Ernst Neufert, the author of the famous *Bauelemente*, published first in 1935, termed the conclusive logic of the brick. However, both Aalto and Neufert, who knew each other personally, had not only admiration for the brick, but they also wanted to reform it, albeit for different reasons.

Neufert recognized that the size of the brick that was used in Germany since 1869 as the norm, was only seemingly logical. Its basic dimension, its length of 25 cm, appears to be conform with the metric system. If we consider the mortar joint, however, this conformity is a mere illusion, and there is no way to coordinate the size of building parts and rooms with that of the brick. Neufert focused his efforts on developing a system that he called Octametric – the length of a brick within this system was reduced to 24 cm, that is, one meter equated four bricks. He claimed that the Octametric system finally creates the missing link between house, room, furniture and body.

Going even further, Neufert had to make some adjustments to fit the natural size of the human body into his systems. In the first, 1936 edition of his famous *Bauelemente* (a handbook of architectural standards) the shoulder height of a "well-built man" was 1,46 m; in 1944 it was already 1,50 m, while the full height remained the same, 1,75 m. That means that he had to shrink the head and neck by 4 centimeters – a remarkable decision at a time when anthropometry was a discipline with ominous consequences in Germany.

Alvar Aalto's idea of standardization was in full agreement with the CIAM position regarding mass production between 1929 and 1932, when he designed standardized fixtures and furniture for the Paimio Sanatorium and the Turun Sanomat building. The large number of prototype drawings shown at

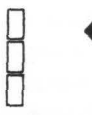
the minimum Dwelling exhibition in Helsinki in September 1930 reflected the CIAM conviction that technological standards are the responses to standard biological needs. The minimal apartment is based on standardization, industrialization and Taylorization.

Frederic Taylor's system of scientific management made improvements possible in the speed of bricklaying. In 1911 Taylor advanced his proposal with reference to the Bricklaying System by Frank B. Gilbreth. Gilbreth's system served as a proof that it is possible to triple the work output merely by optimal organization. In 1932, at the Nordic Building Congress in Helsinki, Aalto gave a talk, arguing for scientific standardization. However, in the years immediately following he was growing increasingly critical of technological rationalization in general. Returning from the US in 1941, Aalto gave lectures in Zürich and six other Swiss cities on the reconstruction of Europe after World War II.<sup>12</sup> He criticized that in the US the standardization in architecture is based on car manufacturing models, despite the basic difference in relation of the object to the site and to nature. He stressed that standardization in architecture should be based on biological models. Aalto spoke about standardization in nature using the example of magnolia flowers: each of them is made up by millions of identical cells, that allow for a richness of form because of the large number of possible combinations between them.<sup>13</sup>

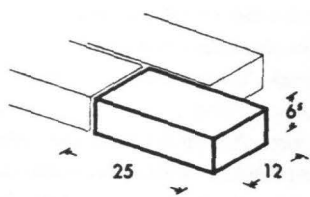
"It is impossible to solve the problems of architecture using technical methods", declared Aalto. "Zentralisierende Standardisierung" (centralizing standardization) results in "psychological slums", therefore society needs a "dezentralisierende Standardisierung" (decentralizing standardization): "Human dwelling is always dependent upon the changing shapes of nature and therefore elastic standardization is, from the psychological and biological point of view, the only possible alternative."

The undulating form of the Charles river façade of Aalto's Baker House (1946–49) is often compared to the water's edge in a landscape, the flow of the river, with a tendency to spread out on a flat land – that is also close to the ideal of limitless horizontal layer of space. The incompatibility of the stereometric form of the brick with the fluid shape of the building as a whole was obvious, particularly for an architect convinced about the benefits of standardization. This is a morphological incompatibility, not a merely numerical one that Neufert wanted to solve. Still, it is again the disregarded non-element of the architecture, the mortar joint, that was the key to the solution. In Neufert's case, the size of the brick had to be modified because the joint has been previously and wrongly disregarded. Now the joint had to carry the curve, so to say, but at a price – the "intelligence" of the single brick, its precise fitting into a well-defined "role", is not obvious at all. "The shape

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### Normalformat



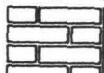
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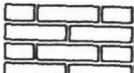
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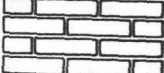
38 + 1 = 39



51 + 1 = 52



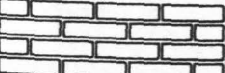
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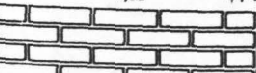
77 + 1 = 78



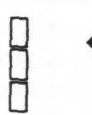
90 + 1 = 91



1,03 + 1 = 1,04

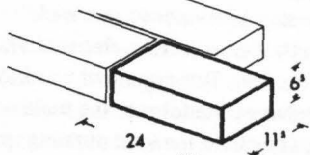


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### OKTAMETERSTEINE UND NORMALFORMAT

#### Oktobermetersteine in Normalsteindicke



11 + 1 = 12



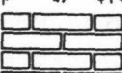
24 + 1 = 25



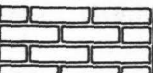
36 + 1 = 37



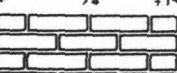
49 + 1 = 50



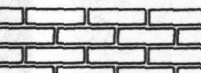
61 + 1 = 62



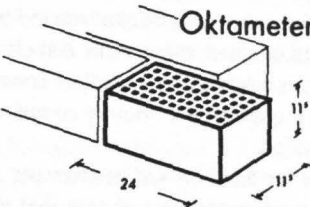
74 + 1 = 75



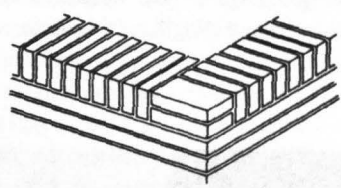
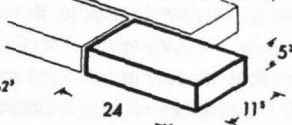
86 + 1 = 87



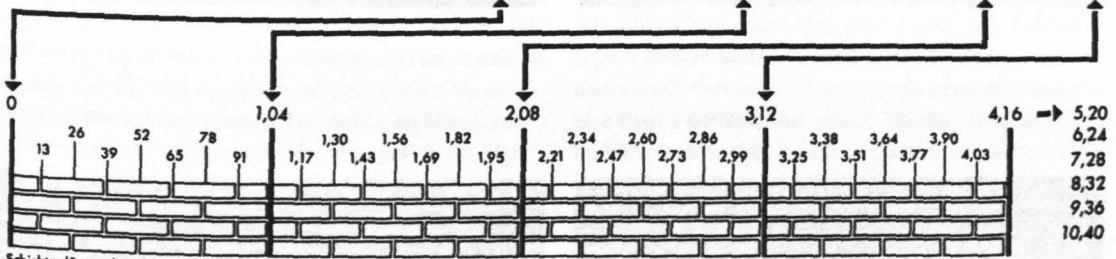
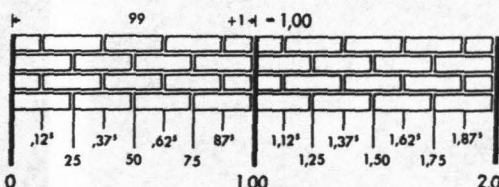
#### Oktobermeter-Hohlstein DIN-Stein



#### Oktobermeterriemchen (DIN-Riemchen)



Schichtenlänge der neuen Oktobermeterformate



Vergleich von Schichtenlängen der alten Normalformate mit den neuen (Oktobermetersteinformat)

5 | Ernst Neufert: Masonry construction with standardized bricks of old type compared to the Octametric system

of the brick wall will retain its cubism, until a brick is found which allows free expression of form. It must be possible to find such a form which can stand as a brick wall and yet create at the same time a round or negative, convex, concave or square wall."<sup>14</sup> – stated Aalto in his 1955 Vienna lecture, *Between Humanism and Materialism*. This argument was based on the analogy between the form of the building and of the brick, and appears somewhat puzzling, particularly in the light of his magnolia example – as we know since Mendelsohn's Einsteinturm in Potsdam, fluid forms can be much more easily and efficiently realized using regularshaped brick than concrete which would require an enormously complicated wooden formwork.

Aalto was familiar with earlier attempts of producing a range of special brick shapes that allowed variations of form. He himself used later special wedge-shaped bricks that made the sharper curves of his Kulturitalo in Helsinki possible. But such practices were morally not unquestionable. Cutting the brick was described already in 19th century brick manuals such as Lacroux's *La brique ordinaire* (1878) as going against the "nature" of the brick. And Frank Lloyd Wright, who was an authority for Aalto,

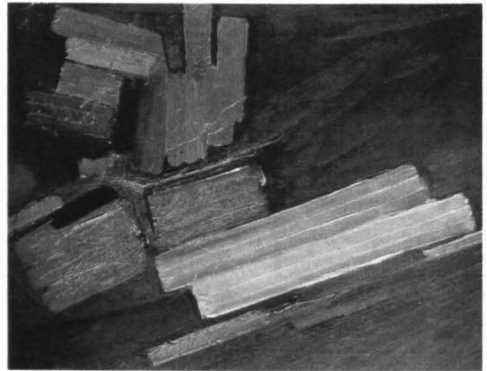
criticized the use of special bricks to build the Monadnock Building in Chicago (Burnham and Root, 1891 resp. Holabird and Roche, 1893): "the flowing contours, or profile, unnatural to brick work was got by forcing the material – hundreds of special mold for special bricks being made – to work out: the curves and slopes."<sup>15</sup>

Fritz Schumacher, in his book *Das Wesen des neuzeitlichen Backsteinbaues* (*The essence of modern brick construction*) wrote about the brick as an educator, that has a certain immanent resistance, and therefore does not allow architects to realize ideas that are too capricious.<sup>16</sup> According to Schumacher, it is sad that materials have to play the brutal role of a "tactics of obstruction" (*Hemmungstaktik*), but in the recent time of speculating entrepreneurs in architecture this role is of great importance.

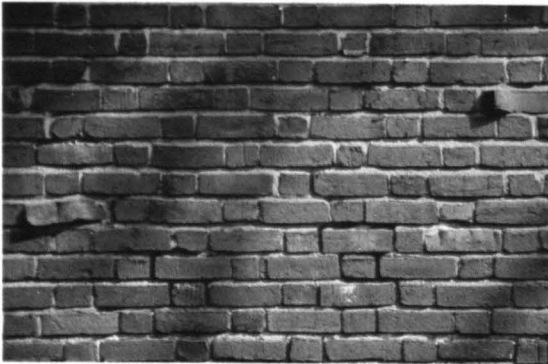
The production of special bricks as well as Neufert's attempts to subordinate all aspects of architecture and life to an allembacing metric grid are similar in giving the brick a welldefined singular geometry, but such strategies seem to erode exactly this "brutal role". Aalto emphasized in his Vienna lecture that what he is searching for is the equivalent of the living cell in nature: "...we are far from having the



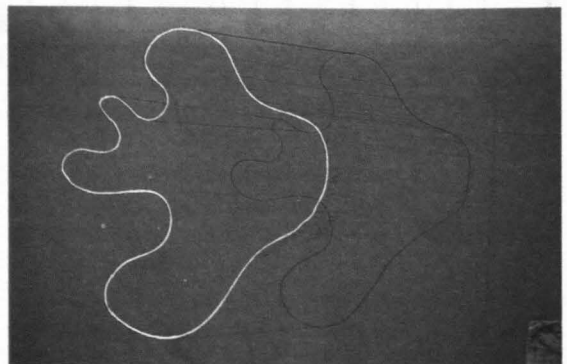
6 | Alvar Aalto, Baker House, Massachusetts Institute of Technology, Cambridge



8 | Alvar Aalto, Oil painting



7 | Alvar Aalto, Baker House, Detail of the façade



9 | Alvar Aalto, Design for Savoy vase

right materials for architectural form to hand which we need. Not only the brick should have a universal form which can be used for anything, all other forms of standardization are the same. When we have reached the stage of being able to achieve different ends with a standard unit which has a soul of elasticity incorporated in the object, then we shall have paved the way between Charybdis and Scylla, between individualism and collectivism."<sup>17</sup> The "soul of elasticity" that Aalto was speaking about, is not an immanent quality of the modern brick, but of the mortar joint, which is the "product" of the bricklayer on the site.

In his earlier Oslo talk, Aalto already compared brick to the living cell: "in nature standardization appears... only in the smallest: units, the cells. This results in millions of elastic combinations in which there is no trace of formalism. Furthermore, this gives rise to the enormous wealth of organic growing shapes and their eternal change. Architectonic standardization must follow the same path."<sup>18</sup>

The visual model of a living cell with no trace of preestablished form was the amoeba, a primary cell of living matter, discussed by a large number of popular science publication that transported the vitalistic philosophy of hugely popular authors such as Ernst Haeckel, Raoul Francé, Wilhelm Ostwald and others into the realm of art and architecture, where they influenced the biocentric and biomechanic ideas of artists like László Moholy-Nagy.

The modern brick and the amoeba, however, show a somewhat disturbing dissimilarity. But more archaic forms of brick architecture are massive walls composed of clumps of clay without a clear geometrical shape. It seems therefore necessary to experiment with all possibilities of brick to find a solution that is precise but rich in historic echoes. The emphasis on experimentation suggest that in Aaltols perception the architect not simply expresses the cultural values of the society, but can play and experiment with them. Johan Huizinga's book *Homo ludens* stressed that in the industrial age it is *homo ludens* will liberate society from the constraints of *homo faber's* productivism. For Aalto, architectural sketches, oil painting and material experiments like the brick façade panels of his Muuratsalo house were all directed toward the same goal. Collisions of solids and gaps filled with fluid material was a formal topic of his painting at this time: "In my work I have seen no other relationship between the three are forms than the material one. Whether I draw sketches, do them in watercolor or in oils is, for me, an experimenting with different materials. It is possible, for example, to use oils in such a way that the results can range from a flat surface to relief. This is a result of the thick texture of the paint. For me, painting in oils is a combination of colour and relief."<sup>19</sup>

The result of this concentrated but playful effort supposed to be an alchemic transformation of mate-

rials. Aalto remembered Wright's words regarding this alchemy in his lecture *Between Humanism and Materialism*, given at the Central Union of Architects in Vienna:

"I was once in Milwaukee together with my old friend Frank Lloyd Wright. He gave a lecture that began, 'Ladies and gentleman, do you know what a brick is? It is a small, worthless, ordinary thing that costs 11 cents but has a wonderful quality. Give me a brick and it becomes worth its weight in gold.' It was the first time I had heard an audience told so bluntly and expressively what architecture is. Architecture is the turning of a worthless stone into a nugget of gold."<sup>20</sup>

It might sound paradoxical that Aalto was searching for the "lousiest bricks of the world"<sup>21</sup> he could find as the basis of elastic standardization, to turn them into "nuggets of gold". The bricks of Baker House are clearly deviations from the standard, they can not be easily assimilated into any concept of mass production. Such bricks only vaguely resemble those depicted in construction handbooks.

What could be more "postmodern" than Aalto's re-theorizing of standardization? Modernity always had to do with technological modernization, but after World War I serious doubts emerged regarding ideologies of technological progress. Aalto's use of the formless shows that modernity could not exist without its other, the the archaic, the unmodern, the geological and biological. He starts with the idea of flexible standardization, that would require a kind of universal identity, and ends stressing the difference of the joint, or of the distorted single brick.

The undulating façade itself is not unambiguous – it is reminiscent of Aalto's various interiors in memory, where very similar surfaces are results of carving a hollow out of a rectangular mass. Similarly, the relation of the main façade to the concrete frame structure results in a strange "liquification" of the joints between the two, a very fragile connection between the elements that seems to follow different logics. The difficult whole with its fragmented borders shows that the architect works on something else than a perfected object. The meaning of the building is not modeled on linguistics, like Neufert's search for a logical grammar of the brick, but results from frictions between the globalizing networks of standardization and communication, and the practical and messy processes of construction and use, where the symbolic dimension plays an important role.

Aalto's playful experimentation with brick, paint and words is not a game without stakes; the iconoclastic gesture is clear. The suppression of the geometry of the grid is complemented by piercing the fabric with deformed clumps of baked clay. It is significant that the "lousiest bricks of the world" as the basis of standardization were assimilable by the Modernist historiography of Giedion as early as



1949. The question remains: what is more irrational, the standardization of the body or the biologization of the brick and how that meeting of *Space, Time and Architecture* is to be imagined under the subtitle of Irrationality.

Author:  
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ETH Zürich

Notes:

- 1) Alois Riegl, *Spätromische Kunstindustrie* (2. ed. Vienna: Österreichische Staatsdruckerei 1927), p. 9.
- 2) Greg Lynn, "Bio-Time", in: Cynthia C. Davidson, ed., *Anytime*, Cambridge, Mass., London, England: The MIT Press 1999, p. 271.
- 3) David A. Hounshell, *From the American System to Mass Production, 1800–1932*, Baltimore and London: The Johns Hopkins University Press 1984, p. 261.
- 4) Caroline Bos, "Painful Materialism", in: *Magic of Materials II* (Daidalos Special Issue, August 1995), p. 22.
- 5) Christian Sumi, Marianne Burkhalter, "Positive Indifference", in: *Magic of Materials II*, p. 26.
- 6) Saskia Sassen, "Juxtaposed Temporalities: Producing a New Zone", in: Davidson, op. cit., p. 116.
- 7) Sumi, op. cit., p. 28.
- 8) Ibid.
- 9) Alvar Aalto, "Art and Technology", in: Aalto, *Sketches* (Cambridge.: The MIT Press 1985), p. 127.
- 10) Alvar Aalto, "The Influence of Construction and Material on Modern Architecture", in: Aalto, *Synopsis* (Basel, Boston, Stuttgart: Birkhäuser 1980), p. 12.
- 11) Alvar Aalto, "The Relationship between Architecture, Painting and Sculpture", in: *Synopsis*, p. 25.
- 12) *Der Wiederaufbau Europas stellt die zentralen Probleme der Baukunst unserer Zeit zur Diskussion*, in: Teppo Jokinen, Bruno Maurer, ed., "Der Magnus des Nordens": *Alvar Aalto und die Schweiz* (Zürich: gta Verlag 1988), p. 177ff.
- 13) Ibid., p. 185.
- 14) Alvar Aalto, "Between Humanism and Materialism", in: *Synopsis*, p. 21.
- 15) Frank Lloyd Wright, *The Future of Architecture*, New York: Horizon Press 1953, p. 151.
- 16) In the German original it is even more explicit: „Es ist nicht so leicht, ihn (den Backstein, Á. M.) für irgendein willkürliches Lüstchen gefügig zu machen, sein ernstes Antlitz widerstrebt der Prostitution, und so liegt in ihm ein natürlicher Damm gegen das Übersäumen unverständener oder abgestandener Unternehmerphantasie.“ Fritz Schumacher, *Das Wesen des neuzeitlichen Backsteinbaues*, München: Callwey 1971, p. 46.
- 17) Alvar Aalto, "Between Humanism and Materialism", in: *Synopsis*, p. 21.
- 18) Alvar Aalto, "The Influence of Construction and Material on Modern Architecture", in: *Synopsis*, p. 13.
- 19) Alvar Aalto, "The Relationship between Architecture, Painting and Sculpture", in: *Synopsis*, p. 25.
- 20) Alvar aalto, "Between Humanism and Materialism", in: *Synopsis*, p. 20–21.
- 21) Göran Schild, *Alvar Aalto: The Mature Years*, New York: Rizzoli 1991, p. 159.