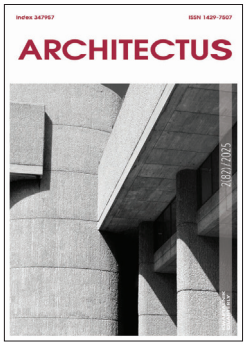

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Haptic features of brutalist architecture expressed in projects and buildings

Abstract

The subject of the article is the perception of tactile and kinesthetic impressions by users of architectural space. The authors present the second phase of a two-stage research procedure regarding the haptics of brutalist architecture. The first stage concerned the theoretical creative assumptions, while the second – the design results, i.e., the constructed buildings. The conducted studies are an attempt to identify and scientifically organize haptic elements in brutalist works. The authors used a heuristic method and the research perspective of extended haptics (including tactile experiences as well as non-tactile experiences that engage the sense of touch). The research material (including 100 buildings) was pre-assessed and selected by the research team according to the selection criteria: spatial properties, spatial relations, material features, surface finishing and embodied spatial experiences. The information obtained was subjected to further analysis based on observation criteria: expression of form, function, structure, and texture. The main goal of the research is to discover, name and scientifically organize the elements of haptic aesthetics present in the works of brutalist architecture. The result of the analyzes is a characterization of the haptic aesthetics of brutalist architecture. The authors distinguished features based on tactile aspects, but also on the cooperation of touch with other senses. They described phenomena occurring on a macro scale – the dynamics of solids and the expression of forces, as well as on a micro scale – surface texture. Research has confirmed the strongly haptic nature of brutalism, based on tactile experiences and haptic imagination.

Key words: brutalist architecture, haptics, touch in architecture, multisensory design

Introduction

Human cognition is based on the senses and the mental processing of obtained information. Impressions and observations, acquired, organized and creatively processed by the human multi-sensory perceptual system, become the material for higher mental operations: abstraction, classification, evaluation, etc. (Majewski 1983, 10). As pre-perception, they shape our memory, imagination, knowledge resources and emotional conceptual referents. Every inaccuracy, error or sensory reductionism finds its response in irregularities affecting the human psychophysical sphere (Bendych 1974, 41). Nowadays, in the era of the production of artificial sensory experiences detached from reality, generated on the screens of digital devices, the issue of maintaining the natural balance of the senses is particularly important. Aspects related to the proper understanding of multisensory perception and the use of the full potential of the senses are fundamental in architecture, which is the concretization of human existential space (Norberg-Schulz 2000, 32). This topic is part of the broad issue of sustainable development, which allows people to fully, effectively and satisfactorily use the resources they are equipped with.

The paradigm of architecture as visual art has become established in the centuries-old architectural discourse. Knowledge of the principles of visual perception, based on the biological abilities of the human visual apparatus, is considered the basis of professional education and workshops for architects. When designing volumes and spatial compositions, the architect focuses on potential view frames and attractive perspective shots from specific viewpoints. After all, the etymology of the word perspective includes the suggestion of "looking through", "seeing through" (Krenz

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2010, 32). However, the result of such a work methodology is an untrue, fragmentary image of architecture, devoid of the multidimensionality, spatiality and materiality inherent in this art. As Juhani Pallasmaa notes, the real image of an architectural work, consistent with the physical truth, cannot be discovered otherwise than through touch (Pallasmaa 2005; 2013). This sense most fully perceives the structure and material properties of solids, but also shapes particularly intense mental and spiritual equivalents accompanying the experience of architecture (Kłopotowska 2020; 2021; Kurek, Maliszewski 2009; Łebkowska, Wróblewski and Badysiak 2016). Unfortunately, issues related to design and haptic perception are not sufficiently researched and popularized in architectural theory. Despite the emerging voices of researchers calling for the appreciation of the sense of touch as an indispensable and even leading aesthetic language, unwavering, radical ocularcentrism still dominates in contemporary architectural research.

The consistent distance with which architecture-science approaches the issues of haptics seems surprising when compared to the ennoblement this sense has received in philosophy. The following should be mentioned here: the concept of touch, subordinate to the intellect, formulated by Aristotle (Arystoteles 1972); the medieval denial of the sinful sense; the progressive thought of René Descartes combining tactile sensations with other senses and noticing the phenomenon of synesthesia (Descartes 2002); recognition of the existence of common elements between sight and touch by George Berkeley (Struzik 2009); the mental concept of Pierre Maine de Biran, linking tactile experiences with the resistance of things (Tisserand 1949); the promotion of touch in the hierarchy of the senses created by Johan Gottfried Herder ("I feel myself! I am!") (Herder 1973), sealed by the 19th and 20th century philosophers of touch, such as Edmund Husserl (Husserl 1974), José Ortega y Gasset (Ortega y Gasset 1982), Emmanuel Lévinas (Lévinas 1998), Maurice Merleau-Ponty (Merleau-Ponty 2001).

Due to the very weak basis of haptic issues in the theory of architecture, the great interest in the sense of touch among contemporary architects seems to be an interesting phenomenon. The works of Zvi Hecker, Glenn Murcutt, Peter Zumthor, Steven Holl, Kengo Kuma, Krystyna Różyska-Tołłoczko, Dariusz Kozłowski, Tomasz Mańkowski take the form of almost a tribute to touch and convey a clear message that we should return to the corporeality of perceiving architecture, which was a natural, intuitive starting point for the first builders (Stec 2015). Tadao Ando's work also shows that the sense of touch is as important in architecture as the sense of sight. He states that he always uses natural materials in those parts of buildings that come into contact with the human hand or foot because he is convinced that people become aware of the true quality of architecture through the body (Botond 1990, 125). In his buildings, Ando brings people into direct contact with the texture of concrete. This happens especially in entrance areas, where narrow passages between monolithic walls force the person to touch the material. In his projects, railings, seats and floors fulfil similar tasks.

The gap between theory and reality identified by the authors is well commented by Michał Podgórski: *Ocularcentric blindness does not allow us to notice the fact that haptic aesthetics is the dominant aesthetics. It has been used to define modernity, progressiveness, worldliness, luxury and affluence for over a hundred years* (Podgórski 2011, 9). In this situation, the authors considered it justified to address the issue of haptics and its importance in the creation of architectural forms.

The trend that the authors researched is brutalism. It developed from the end of World War II until the end of the 1970s (Niebrzydowski 2018). Haptic threads can be seen both in the theory of brutalist architecture and in most brutalist buildings. Brutalism placed great emphasis on the issue of architectural form. Contrasting combinations of solids, strong articulation of elements and dynamics of the composition influenced human senses and emotions. The rough and expressive textures of raw materials encouraged people to explore the buildings by touch.

The issue of haptics as an important component of the aesthetics of brutalist works has not yet been the subject of comprehensive, focused studies on brutalism, hence the author's team decided to subject this aspect, overlooked by other researchers, to a detailed research analysis. The main goal of the research is to discover, name and scientifically organize the elements of haptic aesthetics present in the works of brutalist architecture. This article attempts to build a scientific apparatus enabling the observation and assessment of haptic aesthetics – analogous to commonly recognized methods that refer only to visual perception. However, in the longer term, by popularizing the results of both parts of the research, the authors aim to draw the attention of contemporary scientists to the need to question the dominant ocularcentric perspective to appreciate the role of touch in architectural experiences.

Materials and methods

The presented study is a continuation and complement to the first part of the research devoted to the identification of pro-haptic threads in the theory of brutalist architecture (Niebrzydowski, Duniewicz 2024). The research conducted so far has indicated a strong (though not directly articulated) element of haptic thought, visible in such aspects as:

– negation of the doctrine of modernism,
– architectural and non-architectural inspirations of brutalists,
– innovative architectural experiments,
– main ideas.

The results of the analyses from the first part became the starting point for the authors for research devoted to the identification of haptic elements in completed brutalist works. This duality of research is justified by Jacek Krenz, who states that only in the workshop phase of the creative process does the idea materialize based on the art of building. *Then decisions are also made regarding the selection of materials, textures, colours, etc.* (Krenz 2010, 35, 36). He also adds that it depends on the professional skills of the architect whether […] *the transposition of the idea into a spatial shape will make the form become a carrier of the intentional meanings assumed at the beginning* (Krenz 2010, 36).

The conducted research, similarly to the first part, used the perspective of extended haptics by Marta Smolińska (Smolińska 2016, 66, 67; 2020), in the light of which the scope of experiences attributed to touch is not limited only to physical, tangible tactile acts but it also includes sensations obtained through the touch sensory channel through other senses: sight, hearing, kinesthesia, as well as smell and taste (Fig. 1). A similar construct is also presented by Podgórski – the researcher of haptic aesthetics in art, who distinguishes the so-called first- and second-order haptic objects (i.e., those in which the observer uses touch directly and indirectly) (Podgórski 2011).

Similarly to the first stage of research, the studies carried out in the second part were based on analyses of the research material according to the established selection criteria. As a result of delimiting a broader group of criteria defining haptics in architecture, the research team established the following selection criteria:

– spatial properties,
– spatial relations,
– material features,
– surface finishing,
– embodied spatial experiences.

The research material (common for both stages of the procedure) included all iconographic sources available to the authors (both the authors' own photos and materials published in analogue and digital form). The common set was also the research area (about 100 buildings), which included brutalist buildings from the period 1950–1980. An important factor determining the choice of objects was the authors' decision to present the formal diversity of brutalist works.

At the second stage of the research procedure, separate observation criteria were established (presented in the next section). Based on these criteria, haptic features specific to brutalist architecture were identified and described.

As is the case with intuitive, often subjective, and at the same time highly repeatable results of analyses in the field of visual aesthetics, the main test of the research carried out was the individual, expert analyses of the authors, who were sensitive to the issues of haptics in art and substantively prepared to characterize and describe architectural phenomena.

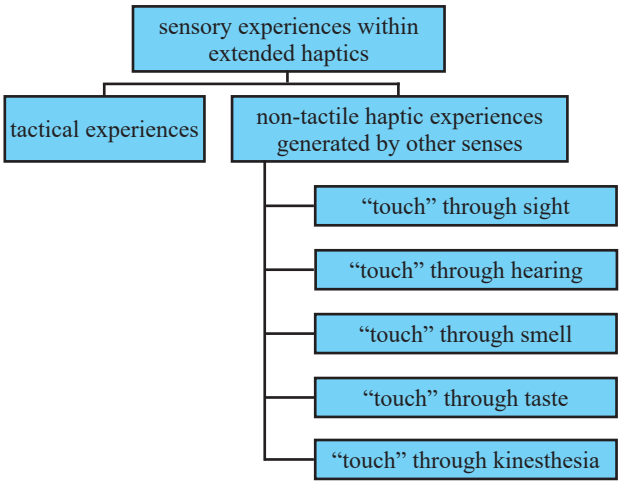

Fig. 1. Types of sensory impressions within extended haptics (elaborated by A. Duniewicz)

Il. 1. Doświadczenia zmysłowe w ramach haptyczności poszerzonej (oprac. A. Duniewicz)

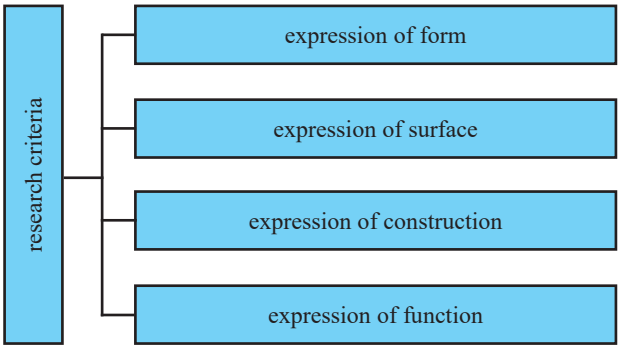

Fig. 2. Research criteria regarding the work of brutalist architects (elaborated by A. Duniewicz)

Il. 2. Kryteria badawcze dotyczące twórczości architektów brutalistycznych (oprac. A. Duniewicz)

Results

The ideas of brutalism were practically reflected in a set of architectural features of a haptic nature. The analyses carried out allowed for the identification of 28 such attributes. It should be emphasized that due to the heterogeneity of the trend and the diversity of the analyzed buildings individual features have different intensity.

In the second stage of the research, the material was analyzed according to the criteria relating to haptics in architecture, which were established by the authors. The three criteria correspond to the basic components of architecture – form, function and construction. The fourth criterion was texture, which was particularly important in brutalism (Fig. 2). As a result, a taxonomy of haptic features of brutalist architecture was created, divided into: expression of form, expression of surface, expression of construction and expression of function (Table 1). Table 1 provides also examples of buildings that clearly demonstrate the 28 identified features (three examples for each feature).

Expression of form

The architectural form was of primary importance in brutalism. This explains the fact that the expression of form category contains the largest number of haptic features. As the building was to be an expressive, material object, the architects strived for massive forms and elements that would impress with their weight. Therefore, the building's components were thick and generally coarsely shaped. An example is the walls, the thickness of which was visible thanks to the deep-set windows.

Most brutalist architects preferred complex architectural forms and used various details. Their buildings consisted of many solids and elements that were clearly articulated. To avoid the impression of excess, they were sometimes harmonized using one dominant material. Extremely complicated

Table 1. Taxonomy of haptic features of brutalist architecture (elaborated by A. Duniewicz)
Tabela 1. Klasyfikacja cech haptycznych architektury brutalistycznej (oprac. A. Duniewicz)

Expression of form	
Feature	Examples
Heaviness and massiveness of forms and elements	– Claude Parrent and Paul Virilio, Church of St Bernadette du Banlay in Nevers, 1965–1968 – Vilanova Artigas, FAU–USP in Sao Paulo, 1961–1969 – Gerd Hänska, Central Animal Laboratory in Berlin "Mausebunker", 1971–1975
Very complex forms	– John Johansen, Robert H. Goddard Library at Clark University in Worcester, 1966–1969 – Walter Maria Förderer, church of St Nicolas in Heremence, 1962–1971 – Basil Spence, Ministry of Justice in London, 1972–1976 (Fig. 3)
Strong articulation of solids and elements in the form	– Paul Rudolph, Government Service Center in Boston, 1966–1971 – Janko Konstantinov, Post Office and Telecommunications Center in Skopje, 1968–1980 – Aldo Loris Rossi, Casa Del Portuale in Naples, 1969–1980
Extreme type of contrast: solid–void	– Paul Rudolph, Temple Street Parking in New Haven, 1959–1962 – Gerhard Kallmann and Michael McKinnell, City Hall in Boston, 1963–1968 – Dariusz Kozłowski and Tomasz Mańkowski, College of Polish Emigrants at Jagiellonian University in Krakow, 1975–1983
Coarsely shaped and thick elements	– Kenzo Tange, City Hall in Kurashiki, 1958–1960 – Jean-Pierre Jouve, Andrei Frieschlander, Charles Mamfredos, Résidence Vision 80 in Paris, 1970–1973 – Chamberlin, Powell & Bon, skyscrapers in the Barbican Estate in London, 1970–1976
Thick walls and deep-set windows	– Le Corbusier, Chapel Notre-Dame du Haut in Ronchamp, 1953–1955 – E.G. Chandler, Peter de Colechurch House in London, 1969–1973 – Maciej Krasiński, Church of Our Lady of Perpetual Help in Duczki, 1979–1985
Various types of geometry: rectangular, diagonal, curvilinear	– rectangular: Behruz Cinici and Altug Cinici, METU Faculty of Architecture Building in Ankara, 1961–1963 – diagonal: Sachio Otani, International Conference Center Kokusai Kaikan in Kyoto, 1963–1966 – curvilinear: Francisco Javier Saenz de Oiza, Torres Blancas in Madrid, 1964–1969
Spatial façades	– Le Corbusier, Carpenter Center for the Visual Arts in Cambridge, 1959–1963 – Clorindo Testa, London Bank in Buenos Aires, 1959–1966 – Marcel Breuer, Becton Engineering and Applied Science Center in New Haven, 1968–1970
Zig-zag design	– Hermann Baur, Hans Peter Baur, Franz Bräuning, Hoch schule für Kunst und Gestaltung in Basel, 1956–1961 – Antonin Raymond, Gunma Music Center in Takasaki, 1956–1961 – Elsworth Sykes, St Giles Hotel in London, 1971–1977
Repetitive or disrupted rhythms	– Le Corbusier, Unite d'Habitation in Berlin, 1957–1958 – Josep Luis Sert, Peabody Terraces in Cambridge, 1962–1964 – Alberto Linner, Costa Rican Social Security Building in San José, 1976–1981
Broken silhouettes of buildings	– Louis I. Kahn, Richards Medical Research Laboratories in Philadelphia, 1957–1961 – Paul Rudolph, Art and Architecture Building in New Haven, 1958–1964 – Norman Engleback, Southbank Arts Center in London, 1964–1968
Overhanging solids	– Marcel Breuer, Whitney Museum in New York, 1963–1966 – Dusan Kuzma, Memorial of the Slovak Uprising in Banská Bystrica, 1960–1969 – Eduardas Chlomauskas, Palace of Concerts and Sports in Vilnius, 1965–1971
Forward-leaning façades	– Le Corbusier, Maison de la Culture in Firminy, 1961–1965 – Lech Zaleski, Building of the Passenger Shipping Station in Gdynia, 1969–1976 – Ieoh Ming Pei, City Hall in Dallas, 1972–1978
Expression of surface	
Feature	Examples
Exposing raw materials	– Le Corbusier, Maisons Jaoul in Neuilly-sur-Seine, 1953–1955 – Giovanni Michelucci, Church of San Giovanni Battista in Campi Bisenzio, 1960–1964 – Achyut Kanvinde, Indian Institute of Technology in Kalyanpur, 1960–1966
Extremely rough textures and uneven surfaces	– Casson, Conder & Partners, Elephant and Rhinoceros Pavilion in London Zoo, 1962–1965 – Paul Rudolph, Christian Science Center in Urbana, 1962–1967 – Fitzroy Robinson, Sampson House in London, 1976–1979 (Fig. 5)
Contrasting textures	– Paul Rudolph, Art and Architecture Building in New Haven, 1958–1964 – Norman Engleback, Southbank Arts Center in London, 1964–1968 – Basil Spence, Hyde Park Barracks in London, 1960–1970
Textures and traces on surfaces showing how the building was constructed	– Le Corbusier, Carpenter Center for the Visual Arts in Cambridge, 1959–1963 – Louis I. Kahn, Jonas Salk Research Institute, 1959–1965 – Josep Lluis Sert, Holyoke Center in Cambridge, 1960–1967

Table 1 continued. Taxonomy of haptic features of brutalist architecture (elaborated by A. Duniewicz)
Tabela 1 cd. Klasyfikacja cech haptycznych architektury brutalistycznej (oprac. A. Duniewicz)

Expression of surface	
Feature	Examples
Visible surface defects	– Le Corbusier, Secretariat Building in Chandigarh, 1950–1953 – John Andrews, Scarborough College in Toronto, 1963–1965 – Vilanova Artigas, Casa Martirani w Sao Paulo, 1969–1974
concave reliefs in concrete surfaces	– Le Corbusier, Unite d'Habitation in Berlin, 1957–1958 – Krystyna Różyska-Tołłoczko, Bunker of Art in Krakow, 1959–1965 (Fig. 6) – AHE Mimarlik and Rolf Gutbrod, Sheraton Hotel in Istanbul, 1959–1968
Expression of construction	
Feature	Examples
Exposing the structure and its elements	– Kiyonori Kikutake, Hotel Tokoen in Yonago, 1963–1964 – William L. Pereira, Central Library at University of California in San Diego, 1965–1970 – Denys Lasdun, National Theatre in London, 1967–1976
Simplified and crude shapes of construction elements	– Alison Smithson, Peter Smithson, Secondary School in Hunstanton, 1949–1954 – Vittoriano Vigano, Marchiondi Spagliardi Institute in Milan, 1955–1957 – J. Lewis Womersley, Jack Lynn, Ivor Smith, Park Hill Estate in Sheffield, 1957–1961
Sophisticated shapes of construction elements	– Paul Rudolph, Greeley Memorial Laboratory in New Haven, 1957–1959 – Andre–Jacques Dunoyer de Segonzac, Pierre Dupre, Basilica of Our Lady of Altagracia in Higuey, 1954–1970 – Marcel Breuer, Becton Engineering and Applied Science Center in New Haven, 1968–1970
Massive and oversized construction elements	– Le Corbusier, Unite d'Habitation in Marseille, 1947–1952 – Affonso Eduardo Reidy, Museum of Modern Art in Rio de Janeiro, 1953–1967 – Harry Seidler, Australian Embassy in Paris, 1975–1977 (Fig. 7)
Exposing and aestheticizing technical elements	– Le Corbusier, Unite d'Habitation in Marseille, 1947–1952 – Marek Dziekoński, Ewa Dziekońska, „Panorama Racławicka" Museum in Wrocław, 1966–1970 – London City Council Architects' Department, Winchfield House in the Roehampton Estate in London, 1954–1959 (Fig. 8)
Expression of function	
Feature	Examples
Articulation of internal functions in the form of a building	– Josep Lluis Sert, Holyoke Center in Cambridge, 1960–1967 – Gerhard Kallmann and Michael McKinnell, City Hall in Boston, 1963–1968 (Fig. 10) – Aldo Loris Rossi, Casa Del Portuale in Naples, 1968–1980
Emphasizing communication elements	– Louis I. Kahn, Richards Medical Research Laboratories in Philadelphia, 1957–1961 – Douglas Orr, Life Sciences Center in Hartford, 1965–1967 (Fig. 9) – Ernö Goldfinger, Balfron Tower in London, 1965–1967
Continuity of function and form – megastructures	– John Andrews, Scarborough College in Toronto, 1963–1965 – Moshe Safdie, Habitat '67 in Montreal, 1964–1967 – Norman Engleback, Southbank Arts Center in London, 1964–1968
Complexity of communication systems	– Behruz Cinici and Altug Cinici, METU Faculty of Architecture Building in Ankara, 1961–1963 – Paul Rudolph, Southeastern Massachusetts Technical Institute in Dartmouth, 1963–1972 – Jean Renaudie, Triangle Housing in Ivry-sur-Seine, 1970–1978

forms were characteristic, especially of the final phase of brutalism, an example of which is the Ministry of Justice in London designed by Basil Spence (Fig. 3). Architects introduced various shapes – rectangular, diagonal, and oval, often contrasting them with each other. In this respect, the buildings became similar to the expressive sculptures of, for example, Eduardo Paolozzi. The façades were also sculptural, shaped not as flat walls but in a spatial manner. Elements such as brise-soleils, bays, loggias and constructional elements were used for this purpose. To achieve the effect of three-dimensional depth, double façade walls were used, as well as the so-called zig-zag design (Kulterman 1970, 76). Parts of the façades were moved forward or moved back. Using such elements and solutions, repetitive or breaking rhythms were achieved, as in Le Corbusier's Unites d'Habitation.

The principle of contrast is visible not only in the aspect of form but in this aspect, it is reflected most radically. Contrasting combinations of volumes and gaps between them provided the façades with a play of light and shadow. This made their composition visible even from a distance, to people moving quickly (e.g., driving a car), and even perceived by people with a weakened sense of sight. The solid vs. void effect was also based on the principle of contrast. The recesses in the façade became dark voids between the illuminated solids protruding forward.

The architects also strongly articulated the silhouette of the building and aimed to make its shape breakable,

Fig. 3. Basil Spence, Ministry of Justice in London, 1972–1976 (photo by W. Niebrzydowski)

Il. 3. Basil Spence, Ministerstwo Sprawiedliwości w Londynie, 1972–1976 (fot. W. Niebrzydowski)

dramatic and even aggressive. If they designed a visible roof, it usually had an unconventional, intriguing shape. Solutions that disturbed the sense of balance had a strong impact on the observer's emotions. These include the overhanging solids and forward-leaning façades. Such strong expression is visible, for example, in the Memorial of the Slovak Uprising in Banská Bystrica designed by Dusan Kuzma (Fig. 4).

Expression of surface

Expression of surface is the second group in terms of the intensity of haptic features in brutalism, which makes this trend unique. In the initial stage of brutalism, building materials were exposed in their raw state, without finishing. A prime example are Maisons Jaoul in Paris designed by Le Corbusier. However, in the following years, careful surface treatment, especially concrete, began to dominate. Architects usually aimed for rough and uneven surfaces, which resulted in chiaroscuro effects also appearing on a micro scale, for example, thanks to bush hammered concrete and corrugated concrete. Such grooves in concrete walls were even 10 cm deep, as in the Sampson House in London designed by Fitzroy Robinson (Fig. 5). Materials with matte surfaces were preferred, so shiny glass surfaces were hidden behind sun-breakers or embedded deep in the façade wall.

The principle of contrast was also manifested in textural solutions. Various materials were combined, and in the case of completely concrete buildings, very rough concrete

Fig. 4. Dusan Kuzma, Memorial of the Slovak Uprising in Banská Bystrica, 1960–1969 (photo by W. Niebrzydowski)

Il. 4. Dusan Kuzma, Muzeum Słowackiego Powstania Narodowego w Bańskiej Bystrzycy, 1960–1969 (fot. W. Niebrzydowski)

was often combined with smooth concrete. The pursuit of imperfection and showing the passage of time was reflected in the emphasis on surface defects and the patina that covered the buildings over the years. The surfaces of the façades also served to represent how the building was erected. The concrete walls showed the lines of joining structural elements, the imprints of the edges of the formwork, or the holes left by the formwork's mounting elements. These traces of the technological process, constituting a kind of ornament, could not only be seen but also touched. Concave reliefs made in concrete surfaces also have an extremely strong haptic character, the most famous of which are those depicting Modulor in Le Corbusier's buildings. Sometimes entire building façades became relief surfaces, as in the Bunker of Art in Krakow designed by Krystyna Różyska-Tołłoczko (Fig. 6).

Expression of construction

In line with the principle of showing how the building was made and how it works, brutalist architects also exposed structural elements. This mainly concerns columns, beams, tie beams, lintels, corbels and slabs. In the first stage of the trend's development, the idea of sincerity required shaping them in a simplified, rational way. This is what Alison Smithson and Peter Smithson did in their first building, the Secondary School in Hunstanton. Its structure consisted of welded steel frames. At a later stage, the crude shapes of the structural elements were replaced with very refined and complex ones. Their size also began to be exaggerated so that they dominated in form. An example is the large pole in the Australian Embassy in Paris designed by Harry Seidler (Fig. 7).

The situation was similar when it comes to displaying technical elements that were brought out and shaped artistically. In many cases, such as the chimneys on the roof of the Unite d'Habitation in Marseille or the chimney of the boiler room at the Winchfield House in the Roehampton estate in London designed by London City Council Architects' Department, they almost turned into sculptures that you could approach and touch (Fig. 8).

Expression of function

Expression of function is linked to the idea of Sincerity and the brutalists' efforts to introduce new non-visual ordering systems (Niebrzydowski 2021). Many architects decided to subordinate the compositions of buildings to the pedestrian traffic system and circulation of users inside and outside the building. This resulted in extreme complexity of circulation systems and excessive communication areas, as well as in exposing and emphasizing communication elements, e.g., service towers (Fig. 9), street decks, ramps, stairs, bridges between buildings, and covered pathways.

Particularly interesting was the articulation of internal functions in the form of the building. A perfect example of such new ordering is Boston City Hall designed by Gerhard Kallmann and Michael McKinnell (Fig. 10). The more open and withdrawn part of its architectural form reflects

Fig. 5. Fitzroy Robinson, Sampson House in London, 1976–1979 (photo by W. Niebrzydowski)

Il. 5. Fitzroy Robinson, Sampson House w Londynie, 1976–1979 (fot. W. Niebrzydowski)

Fig. 6. Krystyna Różyska-Tołłoczko, Bunker of Art in Krakow, 1959–1965 (photo by W. Niebrzydowski)

Il. 6. Krystyna Różyska-Tołłoczko, Bunkier Sztuki w Krakowie, 1959–1965 (fot. W. Niebrzydowski)

the publicly accessible space in the building intended for customers. The overhanging and pushed forward blocks show the mayor's office and the council chamber. In turn, the monotonous rhythm of reinforced concrete elements in the upper part of the building articulates sequences of repetitive office rooms.

Fig. 7. Harry Seidler, Australian Embassy in Paris, 1975–1977 (photo by W. Niebrzydowski)

Il. 7. Harry Seidler, Ambasada Australii w Paryżu, 1975–1977 (fot. W. Niebrzydowski)

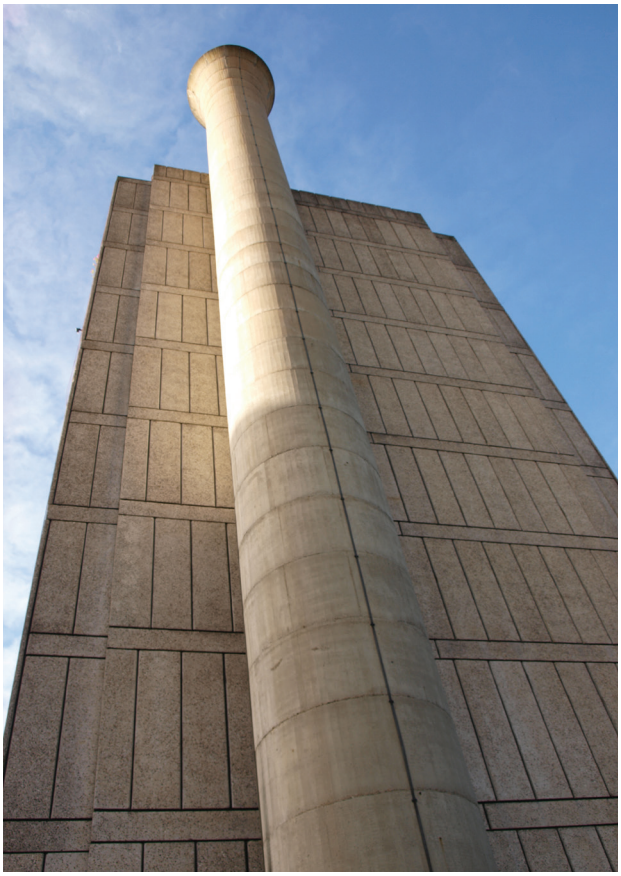

Fig. 8. London City Council Architects' Department, Winchfield House in the Roehampton Estate in London, 1954–1959 (photo by W. Niebrzydowski)

Il. 8. London City Council Architects' Department, Winchfield House na osiedlu Roehampton w Londynie, 1954–1959 (fot. W. Niebrzydowski)

Fig. 9. Douglas Orr, Life Sciences Center in Hartford, 1965–1967 (photo by W. Niebrzydowski)

Il. 9. Douglas Orr, Life Sciences Center w Hartford, 1965–1967 (fot. W. Niebrzydowski)

Fig. 10. Gerhard Kallmann and Michael McKinnell, City Hall in Boston, 1963–1968 (photo by W. Niebrzydowski)

Il. 10. Gerhard Kallmann i Michael McKinnell, ratusz w Bostonie, 1963–1968 (fot. W. Niebrzydowski)

The great importance of pedestrian communication combined with the principle of continuity contributed to the design of large brutalist megastructures. In projects such as Habitat '67 designed by Moshe Safdie or Scarborough College designed by John Andrews, the boundaries between individual buildings, interior and exterior, architecture and urban planning were blurred. This had an impact on spatial orientation and changed the way the users perceived space.

Discussion

Comparing the results of both parts of the research procedure, the authors noticed that haptic threads did not remain only elements of the brutalist theory but also became an inseparable component of the recipient's real experience. In the completed buildings, a number of features of a distinctly haptic character were discovered, manifested in four basic categories: expression of form, expression of surface, expression of construction and expression of function.

The authors' analyses show that the greatest number of aesthetic features is contained in the category of form expression. This is due to the primary importance that the brutalists attached to a strong form that evokes emotions (the idea of Image). Pallasmaa's statement referring to the work of Alvar Aalto but equally relevant to brutalist architecture, can serve as a commentary on the discovered haptic features: *Aalto's architecture exhibits a muscular and haptic presence. It incorporates dislocations, skew confrontations, irregularities and polyrhythms in order to arouse bodily, muscular and haptic experiences* (Pallasmaa 2005, 71). Features from this group are mostly examples of extended haptics, based primarily on the cooperation of sight and the broadly understood sense of touch (including tactile pre-perception, kinesthesia, and even the sense of pain). An interesting aspect is the deliberately created unpleasant character of many features, referring to undesirable phenomena in everyday life – disturbance of balance, sharpness, and coarseness. In the architectural and urban space, the experience of features from this group by the recipient takes place primarily on a macro scale, allowing them to be viewed from a distance.

Features classified as surface expression are also a large group. It is the only group with such a clear share of potential tactile experiences (which does not exclude the share of other haptic experiences). This is facilitated by a specially created micro scale of reception, allowing for direct, bodily contact of the recipient with the material of the walls, floors, and railings. This kind of experience is perfectly illustrated by the East Building of the National Gallery of Art in Washington D.C. designed by Ieoh Ming Pei. Sabine Thiel-Siling writes that since the building opened in 1978, one of its distinctive corners at the entrance has been regularly cleaned to remove the fingerprints of visitors who touch the edge to check its sharpness (Thiel-Siling 1998, 118). It should be noted that, similarly to the expression of form, also in the described group there were features with a negative emotional tone (defects, scratchy textures).

An interesting category is the expression of the construction, dominated by features considered anti-aesthetic: over scaling, crudeness, and exposing technical elements. Many brutalist architects gave the construction of buildings an important role in shaping the form. They did the same with the technical elements. This resulted from the concept of making the recipient aware of how the complex technical system of the building was created and how it works. The dominant way of experiencing, as in the case of form expression, is extended haptics (with a strong aspect of cooperation between sight and kinesthesia).

Features from the function expression group seem heterogeneous in terms of their role in the user experience. On the one hand, they help in spatial orientation by articulating rooms and spaces with specific functions in the façades, as well as by exposing communication elements. On the other hand, they generate an excessive complication of movement. Gideon Fink Shapiro interestingly comments on these features: *The real purpose of the quirky topology is not the earnest expression of building systems but a playful invitation to romp around, through, over, and under the structures. Multilevel terraces and serpentine paths wrap the buildings like the tortuous promenades of a classical Chinese garden* (Shapiro 2013, 101). The meandering space is undoubtedly difficult to accept according to conventional criteria – some passages seem to lead nowhere. However, according to the brutalists, the building should be considered differently – as a system of places and events located along alternative paths. This is confirmed by Reyner Banham, who, referring to the Golden Lane Estate by the Smithsons, states that its image resulted not from expressive shapes and formal elements but from non-architectural aspects, such as continuity and pedestrian communication (Banham 1966, 360).

Taking into account all four groups, it should be stated that in brutalist architecture haptic features were clearly exposed and skilfully used, which strengthened their legibility for the seeing, touching and moving observer. The configuration of these features indicated by the authors and their intensity in particular groups contribute to the identity and uniqueness of the haptic language of brutalism. In this sense, the haptic creative strategy of the brutalists should be considered successful.

Conclusions

Architectural design is an art based on the fundamentals of visual perception. The sense of sight is considered to be the basic addressee of architecture. The ocularcentric attitude of architects, established as a paradigm in centuries-old theoretical discourse, is, however, a backward factor in relation to the development of philosophical thought – which strongly values the sense of touch. Paradoxically, it also contradicts the pro-haptic trends that can be observed in the work of many contemporary architects. Therefore, there is a need to restore the proper hierarchy of senses in architectural art and to scientifically organize issues related to the broadly understood haptic perception of architectural works. Such an attempt was made by the authors of this work.

In the research procedure, the authors conducted two-pronged analyses aimed at defining the features of the haptic aesthetics of brutalism (its identity and unique character). The studies conducted by the authors allowed them to discover strong haptic elements present both in the theoretical foundations of brutalism and in the works of brutalist architects. In the first stage, the theoretical foundations of brutalism were studied, looking for haptic threads in such phenomena as: negation of the haptic aesthetics of modernism, inspirations and creative experiments of brutalists, as well as ideas of the new trend. In the second stage, brutalist buildings were analyzed, looking for haptic features (essential for the aesthetic expression of these works) in four groups: expression of from, expression of surface, expression of construction and expression function.

The effect of the conducted analyses is a systematized set of means of expression that make up the unique, rich language of the haptic aesthetics of brutalism. The authors distinguished a number of phenomena and haptic features (indicating the active cooperation of touch with other senses, including cooperation with sight, kinesthesia, the sense of balance, and the sense of pain) but also indicated tactile phenomena strongly emphasized by brutalists (available to direct, bodily perception). Phenomena occurring on a macro scale were analyzed – including, above all, the dynamism of solids and the expression of forces. At the same time, attention was also paid to the brutalists' efforts to introduce a micro scale of reception, including, above all, a clear surface texture. Both on the macro and micro scale, a tendency to use anti-aesthetics was noticed – by creating uncomfortable, unpleasant, inelegant experiences for the recipient.

In the authors' opinion, further research is necessary to organize the areas of architectural theory and practice closely related to haptic aesthetics. The proposed research procedure can be used by subsequent researchers to conduct analogous studies of the haptics of other architectural trends. This method can also be useful for comparative analyses, differentiating individual architectural trends due to their haptic aesthetics.

One of the interesting topics that deserve further, in-depth study is the strongly emotional nature of the haptic aesthetics of brutalism, discovered by the authors. The authors plan to carry out another study devoted to the psycho-physical experiences of the recipient (including determining the compatibility of the theoretical ideas of the brutalists and the perceptual results).

The results of the authors' research indicate the enormous potential of touch as a medium for creating and perceiving architecture. The condition for further development of this issue is a re-evaluation of existing beliefs and the introduction of new methods and tools that allow the observation and analysis of haptic phenomena. Such research can and should become an important element of extensive studies in line with the idea of sustainable development.

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Streszczenie

Haptyczne cechy architektury brutalistycznej wyrażone w projektach i realizacjach

Tematem artykułu jest odbiór wrażeń dotykowych i kinestetycznych przez użytkowników przestrzeni architektonicznej. Jego autorzy przedstawili w nim drugą fazę dwuetapowej procedury badawczej dotyczącej haptyczności architektury brutalistycznej. Pierwszy etap dotyczył teoretycznych założeń twórczych, natomiast w drugim skoncentrowano się na projektach i zrealizowanych budynkach. Przeprowadzone badania są próbą identyfikacji i naukowego uporządkowania elementów haptycznych w dziełach brutalistycznych.

Autorzy zastosowali metodę heurystyczną i perspektywę badawczą haptyczności poszerzonej (obejmującej doświadczenia dotykowe i pozadotykowe, angażujące zmysł dotyku). Materiał badawczy (obejmujący 100 budynków) został wstępnie oceniony i wybrany według następujących kryteriów: właściwości przestrzennych, relacji przestrzennych, cech materiału, wykończenia powierzchni oraz ucieleśnionych doświadczeń przestrzennych. Uzyskane informacje poddano dalszej analizie w oparciu o kryteria obserwacyjne: ekspresję formy, funkcji, konstrukcji i faktury. Głównym celem badań było odkrycie, nazwanie i naukowe uporządkowanie elementów estetyki haptycznej obecnych w dziełach architektury brutalistycznej. Wynikiem analiz jest charakterystyka estetyki haptycznej architektury brutalistycznej.

Autorzy wyodrębnili cechy oparte na aspektach dotykowych, ale także na współpracy dotyku z innymi zmysłami. Opisali zjawiska zachodzące w skali makro – dynamikę brył i ekspresję sił, a także w skali mikro – fakturę powierzchni. Badania potwierdziły silnie haptyczny charakter brutalizmu, opierający się na doświadczeniach dotykowych i wyobraźni haptycznej.

Słowa kluczowe: architektura brutalistyczna, haptyczność, dotyk w architekturze, projektowanie multisensoryczne