

## Urban Symbolism in Bucharest (Romania)

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### Abstract and Introduction

The paper is analyzing the forms of urban symbolism existing within some significant civil “spaces” in the capital of Romania - Bucharest. It is presenting the generative grammars and the mathematical “derivatives” developing within the main buildings (round, vertical, well-balanced forms, architectural correlations, artifacts, a. s. o.). In the paper, we have considered the idea that the great monumental buildings in the capital of Romania – by means of some attached graphic forms proper to their respective architecture – might also be subject to an analysis using generative grammars. Thus, we have started from some simple but fundamental graphic forms. In the context of the analysis (by using graphic generative grammars, refer to auxilliary ornaments and symbols, to frescoes and others, which are specific to those monumental buildings. Generative grammars, by introducing some generating laws relative to graphic forms, may determine the apparition of big architectural frames, where some of them may fall into the category of big complex systems. The latter may be also connected to formal languages, in the direction of generating primary symbols which, by means of different composition (association) laws, may generate complex graphic forms, of architectural level. It is to such graphic forms that the current paper refers, by identifying the ones considered as essentials, also put into evidence by the main monuments (urban symbolism) of the city of Bucharest. At the same time, the optimality thus obtained will have an impact, to a large extent, on the improving of the mechanisms and performances of the architectural “design”. For the clarity of some used terms, they are explicitated within the annex, observing the usual descriptive form existing in the specialized dictionaries. In the second part of the current paper, we have also analyzed the components of urban symbolism, generated by the gardens and parks in Bucharest and we have considered also the its effect on the psychology of the Human being, by taking into account the Weber-Fechner psychophysical law. We have also made some comparisons concerning those spaces proper to Nature, necessary to man with some similar ones in the big world cities, such as Stockholm, Paris, London, New York, Beijing..., and, at the level of the city of Bucharest, the existence of landscape architecture is requested. (We may give the example of the Royal Garden in Balchic, which, during the period 1913-1940 was the property of the Romanian state, a period during which, the Queen Mary of Romania invited, apart from some landscape specialists from Romania, some from Italy and Switzerland, with a view to correctly organizing the respective garden. In this context, we have also taken into consideration different landscape architectural styles). It is also referring to the information flow thus generated at the aesthetic level (aesthetic information and perception) and at the anthropological level; it is estimating the relationship existing between the microstructural topology of an aesthetic level and the one having a macrostructural level. It is analyzing the existence of relationships between the natural and artificial levels of “spaces”. Connections are made according to some significant ideas in the book with the title “Urban Symbolism”, issued and coordinated in 1993 by the Dutch anthropologist Peter J. M. Nas. The present paper is substantiating the idea that Bucharest city can (also) be considered as part of the above-mentioned “segment”. This is an analysis of the interdisciplinarity among mathematics, generative languages, formal languages, algorithmic forms, architecture and urban symbolism. There are formal similarities with the grammar of the natural language, but, this time, the generating rules are applied to architectural graphic forms, generating, in the context different “geometries”.

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The analysis in the paper is taking the following directions:

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a) **description** of optimal architectural “spaces” (presently existing in Bucharest) and their significance generated by their architectural style, by the building period and by the form of their aesthetic perception;

b) **identification** of generative grammars, as well as of topological “derivatives” of a certain mathematical order; analysis of the informational non-redundant flow that has both an aesthetic and an anthropological level; assessment of the relationship existing between the “spaces” having a micro-structural topology and those having a macro-structural one, between natural and artificial “spaces”;

c) **forms** of urban symbolism generated in Bucharest (Romania) – **Conclusions.**

a) **Competitive architectural “spaces” (presently existing in Bucharest) and their significance generated by their architectural style, by the building period and by the form of their aesthetic perception**

Bucharest city is the capital of the European state Romania. The Romanian state is presently < bordered > by the following neighboring states: Ukraine, Republic of Moldavia (North-East), Hungary, Serbia (West), Bulgaria (South). In the South-East, Romania has a coast strip giving access to the Black Sea. It is a member state of the North Atlantic Treaty Organization (since March 29<sup>th</sup> 2004), as well as of the European Union (since January 1<sup>st</sup> 2007). It has a surface of 238.397 km<sup>2</sup>, a population of 19 million inhabitants. The capital of Romania has a surface of 228 km<sup>2</sup>, a population of 2.300.000 inhabitants, an average density of 8.074,6 inhabitants/km<sup>2</sup>. Some of the significant architectural < spaces > in Bucharest - analyzed by means of the connection among the architectural style used, the building period and the aesthetic perception – fall into the following (*essential*) categories:

A) Cathedrals, Churches, Monasteries; B) Palaces; C) Museums; D) Academies, Colleges, Institutes, Universities, Libraries; E) Important buildings, scientific/cultural centers, monuments; F) Avenues, squares, important streets; G) Symbol-houses; H) Parks, Lakes, Gardens.

### A

1. **Romanian Patriarchal Cathedral**, Brancovan style, orthodox cult, 1656, expressive decorative art;
2. **Kretzulescu Church**, Brancovan style, orthodox cult, 1720-1722, expressive decorative art;
3. **Our Lady’s Church (Doamnei Church)**, Brancovan style, orthodox cult, 1683, expressive decorative art;
4. **Stavropoleos Church**, Brancovan style, orthodox cult, 1724, expressive decorative art;
5. **Coltea Church**, Brancovan style, orthodox cult, 1702, expressive decorative art;
6. **Antim Monastery**, Brancovan style + Italian Baroque, orthodox cult, 1713-1715, expressive decorative art;
7. **St. Joseph Roman-Catholic Cathedral**, neo-gothic style, Roman-catholic cult, 1884, buttresses, stained-glass windows, expressive sculptural and decorative art;
8. **Apostolic Nunciature**, neo-Romanian style + neo-gothic, 1900-1902, expressivity;
9. **Anglican Church**, English architecture, Anglican cult, 1913-1914, face brick;

10. **Italian Church**, Tuscan Renaissance, Roman-catholic cult, 1915-1916, expressive sculptural and decorative art;
11. **Coral Temple**, following the models for the original religious buildings (the Vienna Temple) of the Jewish communities in Central and Eastern Europe/1850-1900, built during the periods 1866-1867/1932-1933;
12. **Armenian Church**, historic regional architecture, traditionally Armenian, Gregorian cult, 1911, expressive decorative art;
13. **Greek Church**, ancient Greek style (ionic pseudo-peripteral temple with six columns and a pediment crowned with a Greek cross), orthodox cult, 1899, expressive decorative and pictorial art, historical Greek forms;
14. **St. Sylvester Church**, neo-Byzantine style, orthodox cult, 1839, expressive decorative art;
15. **Casin Monastery**, monumental neo-Romanian style, orthodox cult, 1937-1938 and 1946-1959, linear lines and a stable reinforced structure, high stilobate, torsated turrets, marble-staired parvis.

## **B**

1. **Cantacuzino Palace**, École des Beaux-Arts and Art Nouveau styles (honor platform), 1898-1906, prolix decoration, hyperbolic furniture, monumental gates, parvis, expressive decorative art;
2. **Kretzulescu Palace**, eclectic style, 1902-1906, elaborate crowning and a composite façade decoration, imaginative metal structures;
3. **Palace of the Patriarchy**, antique Greek style, well-balanced peristyle portico, harmonized with the parvis of the Romanian Patriarchal Cathedral (in its vicinity), 1903-1907, well-balanced interiors, <stucco> decoration, wood panelling, expressive decorative art;
4. **Metropolitan Palace**, Byzantine style, 1932-1937, volumetric buildings of the fortified castle type, parvis with oblique entry steps, in the vicinity of the Romanian Patriarchal Cathedral (A.1), expressive decorative art;
5. **Central Savings Bank**, Byzantine style, 1900, octagon cupola, central arch sustained by double composite columns, mural compositions of expressive decorative art;
6. **Industrial Credit Building**, classic style, 1934-1935, soberness;
7. **Court of Justice**, French Renaissance style, 1890-1895, massive stone structure, expressive sculptural art;
8. **Cultural League Hall**, neo-Romanian style + Art Déco, 1926-1929, circular roof turret;
9. **Royal Palace**, Charles II style, 1930-1937, parietal painting, expressive sculptural and decorative art;
10. **ARCUB – Center of the Society of Civil Servants**, Art Déco style, 1932-1934, geometrized interior, marble, wood panelling;
11. **Ministry of Justice (Palace of the Veterinarians)**, neo-Romanian style + Art Déco, 1929-1932; expressive;
12. **Central Post Office**, antique Greek style (Doric order), 1894-1900, portico, steps running along the full length of the colonnade, expressive sculptural art;
13. **Cotroceni Palace**, Venetian classic + romantic styles, 1888, princely residence, expressive sculpture and decorative art;
14. **Romanit Palace**, Venetian + Arab style, 1883, art collections;
15. **Sutu Palace**, neo-gothic style, 1833, history and art collections;

16. *Stirbei Palace*, classic Greek, 1833-1835, expressive sculptural art (Caryatids, colonnades);
17. *Telephone Company Headquarters*, American style (old style skyscraper) + Art Déco, 1929-1934, structure of rivet-mounted rigid steel, monumental ornaments;
18. *Victoria Palace*, neo-classic style, architecture of the Mussolini time, 1937-1944, pilasters, arched portico (ground floor), Carrara marble plating, noble materials, expressive art;
19. *National Bank of Romania*, French Renaissance style, 1883-1900, statuary, monumental stairs, sumptuous inner space, expressive decorative art;
20. *Ministry of Transportation*, classic style, 1934-1940 and 1944-1952, soldered steel structure embedded in concrete, symmetry axes, volume, continuous panel placed among pilasters, stilobated with arches and grey granite;
21. *Mogosoia Palace*, Brancovan style, 1700, 1925-1930, 2000, expressivity.

## C

1. *Museum of European Art*, Tudor style, 1937, books, paintings, engraving, art objects, frameworks (platband), wrought iron work, embedded stained glass windows;
2. *National Museum* (Romanian Peasant Museum), neo-Romanian style, 1912-1938 / 1965-1966, red brick cladding, monumental proportions, sober decoration, expressive monumental art;
3. *Folk Art Museum*, neo-Romanian + European Art Nouveau style (the orientation of Catalan modernism of the year 1900), 1906-1907, wood, frescoes, ceramics, sculptured stone, free overall shapes, base course, round upper watch-tower;
4. *Museum of the Village <Dimitrie Gusti>*, Romanian style, Romanian sociology, 1936, rural architecture, Romanian churches, vernacular households, Romanian traditional interiors;
5. *National Art Museum* ≡ *Royal Palace* (B.9);
6. *National Museum George Enescu* ≡ *Cantacuzino Palace* (B.1);
7. *National History Museum* ≡ *Central Post Headquarters* (B.12);
8. *Stork Museum*, regional romantic style of Northern Europe + Art Nouveau, 1912-1915, stone art / wood, expressivity;
9. *National Museum of Natural History <Gr. Antipa>*, arrangements characteristic to natural history museums, 1908, inaugurated by the King of Romania Charles I, expressivity.

## D

1. *University* / (Rectorate, Faculty of Law), neoclassic style, 1933-1935, honor platform, vestibule, aula magna, semi-cylinder apses for the amphitheatres, statuary, sculpture, expressivity;
2. *University* //, neoclassic style, 1857-1869, 1914-1934, 1963-1964, allegoric statuary groups, small cupolas;
3. *College of Medicine and Pharmacy <Carol Davila>*, neoclassic style + Beaux Arts, portico with ancient Greek columns of Corinthian order, 1899-1903, expressivity, (in the vicinity – the Anthropology Institute of the Romanian Academy);
4. *Faculty of Law* ≡ *University* / (D.1);

5. **Biological Research Institutes**, neoclassic style, 1887, 1930, 1925, 1929-1932, 1975, expressivity;
6. **Romanian Cultural Institute**, neo-Romanian style, 1930, high relief, corner tower, expressivity;
7. **Geological Institute and Museum**, classic neo-Romanian style, 1906-1924, monumental entrance in the axis, varied fenestration, ample roof, expressivity;
8. **Institute of Public Hygiene**, neoclassic style, 1933-1939, central entrance cross-beam; didactic functions;
9. **Institute of General History**, Romanian neoclassic style, 1938, mural ground for fresco paintings (entrance peristyle, expressivity);
10. **Goethe Institute**, neoclassic style, 1922, slightly curved volumes, expressivity;
11. **Institute of Art History**, Brancovan style, 1910-1912, expressivity;
12. **Academy of Economic Sciences**, modern style, 1967-1970, extension of the Commercial Academy (1926);
13. **Academy of Agricultural Sciences**, monumental classic style, 1931-1933, much as
14. an Anglo-Saxon campus, architectural soberness, expressivity;
15. **Army Academy**, monumental classic style, 1937-1939, classical disposition of lower wings with a dominant central element, sumptuous statuary, vast square and esplanade, architectural soberness;
16. **Library of the Romanian Academy**, modern style, 1936-1937/1992-2000, clearly cut volumes, expressivity;
17. **Romanian Academy**, neoclassic style, 1850-1900, aula, expressive decorative art.

## E

1. **Romanian Athenaeum, (Concert Hall of the Bucharest Philharmonic)**, neo-Greek style (portico), cupola (on a metal structure) and front of Ionic order, fresco frieze, *belle époque interiors*, wrought iron gates, expressive decorative art;
2. **National Opera House**, Italian style, 18<sup>th</sup> century, baroque (circular medallions, central arches to match the façade order, statuary), 1952-1953, interior decorative art – Brancovan style;
3. **Palace Hall**, vaguely neoclassic style, 1957-1960, rectangular volume covered by a flattened cupola (in its vicinity – Cismigiu Garden) (H.3));
4. **Opera and Ballet Theatre ≡ National Opera House** (E.2);
5. **Bucharest National Theatre**, classic style, 1964-1973, 1983-1984, a structural cantilever surrounding the central corpus, vertical arch superposition, theatre halls (main theatre hall, small theatre hall (Italian style), amphitheatre);
6. **Bulandra Theatre ≡ Cultural League Hall** (B.8);
7. **National Officers Circle**, *beaux arts* style, 1910-1923, compact volume, supra-elevated terrace, imposing building, corner bastions, decorative elements, expressivity;
8. **UNESCO House ≡ Kretzulescu Palace** (B.2);
9. **General Assembly of Engineers of Romania**, neo-Romanian style, 1925, explicit reference to the engineering genius of Roman aqueducts in the three-leveled façade arches, good bearing brickwork, facing plastering + outline of the facade – with mineral dust;
10. **Headquarters of Industrialists of Romania**, Italian style as in Mussolini time, 1938, classic-like structure, portico between two bas-relief pillars, travertine cover, monumental bronze gates, expressivity;
11. **Athenée Palace**, eclectic style, 1935-1938 and 1964, expressivity, (presently, its name is Hilton);

12. *Ambassador*, modern + classic + Art Déco styles, 1937-1938, curved façade, expressivity;
13. *Lido*, Art Déco style, 1934, expressivity;
14. *Ministry of Agriculture*, French Renaissance style, 1895, monumental façade in brick and ashlar stone, friezes, expressivity;
15. *Ministry of Justice* ≡ *Palace of the Veterinarians* (B.11);
16. *Government Offices* /, Corinthian style, 1938-1941, three-register sober structure (plinth, median, entablature);
17. *Government Offices* //, (Post Customs House), neo-Romanian style, 1914-1926, symmetry transposed in molding / bosses;
18. *Ministry of Public Works*, (Main Major House), neo-Romanian style, 1906-1910, medieval details, symmetry, central corpus with corner structure, trilobite arch., columns, Byzantine capitol, logia;
19. *Ministry of Industries*, mixed style between classic and modern, 1936-1941, formal monumentality;
20. *Berliner Gesellschaft Bank*, German style, 1910-1913/1983-1984, mural painting, galleries, passages, expressivity;
21. *Chrissoveloni Bank*, late Italian Renaissance style, 1923-1928, neo-romantic, expressivity;
22. *Marmorosch Bank*, neo-Romanian + Byzantine + Gothic + Art Déco styles, 1915-1923, polished granite, porphyry, marble, rough boss stone, wrought iron work, monumental structure, expressivity;
23. *Financial Plaza Bank*, postmodern style, 1994, high building with capsulated ground floor, expressivity;
24. *Centre for Advanced Studies in Architecture and Urbanism*, neo-Romanian style, 1910-1913, monumental expressivity, square atrium with zenithal skylight;
25. *International Commerce Centre*, postmodern style, 2003-2005, high building, remarkable structures;
26. *Special Funds of the National Library*, neo-Romanian style, 1908, posterior façade with loggia and garden, black granite, marble, expressivity;
27. *Lafayette Galleries*, Art Déco style, 1928, structure in concrete frameworks, significantly sized openings;
28. *Patriarchal Residence*, Byzantine style, 1932-1937, fortified castle volumes, expressivity;
29. *Triumph Arch*, neo-Romanian style, 1935-1936, reinforced stone and concrete, monument, expressivity.

## F

1. *Carol Avenue (up to Rossetti Square)*, cubist style, 1915-1935, oblong form;
2. *Airmen Avenue*, cubist style, 1910-1920, Monument of the Air Heroes, rich vegetation;
3. *„Bratianu” Avenue*, modern style, 1930, shopping area;
4. *Dacia – Dorobantilor Avenue*, cubist + modern styles (medium height buildings), 1930, expressivity;
5. *Lasca Catargiu Avenue*, eclectic *Beaux Arts* + romantic + neo-Romanian + Byzantine + cubist styles, 1900, expressivity;
6. *Queen Elisabeth Avenue*, neo-Romanian + cubist + Byzantine styles, 1900, rectilinear structures, sculptured buildings and expressivity;

7. ***Dorobantilor Avenue (Infantrymen Avenue)*** , *Beaux Arts* style, 1900, rich gardens, monumental buildings, expressivity;
8. ***University Square***, eclectic style, 1857, stylistic cohesion, in the vicinity – the State University, Sutu Palace, Central Bank, statues;
9. ***Roman Square***, almost cubist style, 1900, buildings with different architecture, sculpture of the Capitol she-wolf (copy);
10. ***Victory Square***,, neoclassic + modern style, 1831, unfinished façades;
11. ***21<sup>st</sup> December 1989 Square***, French Renaissance style with Parisian influence, 1880, in the vicinity – Sutu Palace and Garden, Coltea Hospital, Ministry of Agriculture, the University, the National Theatre;
12. ***Stavropoleos Street***, gothic style, 1875, picturesque and expressivity;
13. ***Batistei Street***, Charles II monumental style, 1900, monumental residences with gardens, expressivity;
14. ***Amzei Church Street***, complex heteroclite style (neoclassic + neo-gothic + belle époque + neo-Romanian styles), 1900, picturesque and expressivity;
15. ***Paris Street, Washington Street, Nicolae Velescu Street***, complex heteroclite style (neoclassic + neo-gothic + belle époque + neo-Romanian), 1900, picturesque and expressivity;
16. ***Cotroceni District*** , complex heteroclite style (neoclassic + neo-gothic + belle époque + neo-Romanian), 1933, in the vicinity are the Botanical Garden, the College of Medicine, Cotroceni Palace, expressivity.

## G

1. ***Assan Residence*** (House of the Scientists), *École des Beaux-Arts* style, Art Nouveau (wood panelling), 1914, remarkable façades and interiors, monumental stairs towards the garden), expressivity;
2. ***Capsa Residence***, *belle-époque* style, 1874, expressivity;
3. ***Teachers' Association Building***, Art Nouveau + neo-Romanian styles, 1912, console and asymmetrical volume;
4. ***Dissescu Residence*** ≡ ***Institute of Art History*** (D.11);
5. ***Elisabeta Cantacuzino Residence***, cubist + neo-Romanian styles, 1934, ceramics roof, expressivity;
6. ***Poru Residence***, Italian Renaissance style, 1931, expressivity;
7. ***Malaxa Residence*** ≡ ***Romanian Cultural Institute*** (D.6);
8. ***Tattarascu Residence***, neo-Florentine style, 1937, Swiss “chalet” type, columns loggia, oblong windows, expressivity;
9. ***Vernescu Residence***, romantic style with Italian influences, 1906, oval-structured stairs, marble, painted wood;
10. ***”Paciurea” Residence***, Art Nouveau style, 1906, stucco building outline, wood with curved sash bars;
11. ***Retired Lyric Artists' Building***, modern classic style, 1936-1938, stone with classic letters, much like Italian houses, in the vicinity – the Ministry of Education and Research, expressivity;
12. ***Florescu Burileanu Residence*** ≡ ***Goethe Institute*** (D.10);
13. ***Juster Residence***, cubist style, 1931, white embedded stained glass windows, furnishing, expressivity;
14. ***Dimitrie Cantemir High School***, Romanian style, 1926, face brick, stress on the attic, expressivity;

15. **Kimon Loghi Residence**, Art Nouveau style, 1923, differentiated openings (form, platbands), bays.

## H

1. **Botanical Garden**, landscape character, 1884-1885, in the vicinity – the Cotroceni Palace, the campus of the Polytechnic Institute, inside is the Institute for Genetic Research, expressivity;
2. **Cotroceni Park**, landscape character in harmony with the neo-Romanian + Beaux Arts + Art Nouveau + Venice classic styles specific to the Cotroceni Palace, 1893-1900/1977-1989, (partially) forest, natural shore;
3. **Cismigiu Garden**, landscape character, 1910, much like *Jardin des Plantes* (Paris), “Roman circus” with busts of literates, interior lake;
4. **Charles II National Park** (Herestrau), landscape character, 1936-1939 and 1952-1953, in the vicinity are the Miorita Fountain, Triumph Arch, Charles de Gaulle square, Casin Monastery, an interior lake;
5. **Filipescu Park**, landscape character in harmony with Florentine + Mauro + neo-Romanian + Art Déco + Bauhaus styles, Swiss ”chalet” type, atmosphere of a garden town;
6. **”Lia Manoliu” Park**, landscape character, Italian Renaissance style much like the open-air antique theatre, 1950-1953, interior stadium for sports / Olympic events;
7. **Charles I Park**, romantic landscape character, 1905-1906, in the vicinity – Cutitul de Argint
8. Church, the Roman Arenas, the Tomb of the Unknown Hero, Zodiac Fountain, Astronomy Institute.

Eight categories of urban types (A ÷ H), as well as 128 components have been identified. The main architectonic styles and landscape aspects (H) are the following:

- A. Cathedrals, Churches, Monasteries: Brancovan / neo-Romanian style;
- B. Palaces: Byzantine / classic / neoclassic style;
- C. Museums: Romanian / neo-Romanian style;
- D. Academies, Colleges, Institutes, Universities, Libraries: classic / neoclassic style;
- E. Important buildings, scientific/cultural centers, monuments: neo-Greek/ Italian / classic / French Renaissance / neo-Romanian / Byzantine style ;
- F. Avenues, squares, important streets: cubist / neo-Romanian / classic style;
- G. Symbol-houses: École des beaux-arts / art nouveau / belle-époque / cubist style;
- H. Parks, Lakes, Gardens: romantic landscape (Florentine, French) style.

Taking into consideration that the Brancovan and neo-Romanian styles have a native character (strictly Romanian), one can find brief references to the former, in the notes below.



## Note 1

**Brancovan style:** Its bases can be traced back to the years 1632-1654; it is characteristic of the pictorial, as well as architectural arts in the Principality of Walachia (part of present Romania). In the respective period, one should remark the reign of Constantin Brancoveanu (1688-1714). That style extended up to the period 1730-1735. It is characterized by harmony and slenderness, with bolts built as a semi-cylinder or as a semi-spherical cupola. The decoration is sculpted in stone (floral motives) or represented by oriental-like ornaments (stucco). Palaces have watch-towers, logia and exterior stairs and were built in the vicinity of some lakes, in right angle spaces. Churches are decorated with stone reliefs, while monasteries are oriented according the East-West axis. The painting dwells on religious subjects, as well as iconographic themes. Determinant influences are generated by the Italian-Cretan school, by the Occidental painting, while influences in sculpture are generated by the Baroque style (anthropomorphic motives, friezes of tombstones, etc.).

**Neo-Romanian style:** Its bases can be traced back to the period 1880-1920; it is characteristic of a certain segment of both the pictorial and architectural art in Romania. It was generated by the “rural” segment in the Romanian state. Popular style is encountered in the counties of Arges, Valcea, Gorj. It may be remarked on certain buildings (Lahovary Residence, Stavropoleos Church, Monteoru Residence, Vernescu Residence, College of Architecture, etc.); it introduced the traditional style in fitting up representative domains (Bratianu Family (Pitesti)). It is characterized by the watch-tower, the three-lobed arching, the wooden pillars, polychromatic ceramics, stucco decoration of the Brancovan type.

**b) Generative grammars characterizing some architectural spaces identified in the capital city of Romania; non-redundant information flow having both an aesthetic and an anthropologic level; relationship existing between “spaces” with a micro-structural topology and those with a macro-structural topology, between natural and artificial “spaces”**

**b1) Generative grammars characterizing some architectural spaces identified in the capital city of Romania**

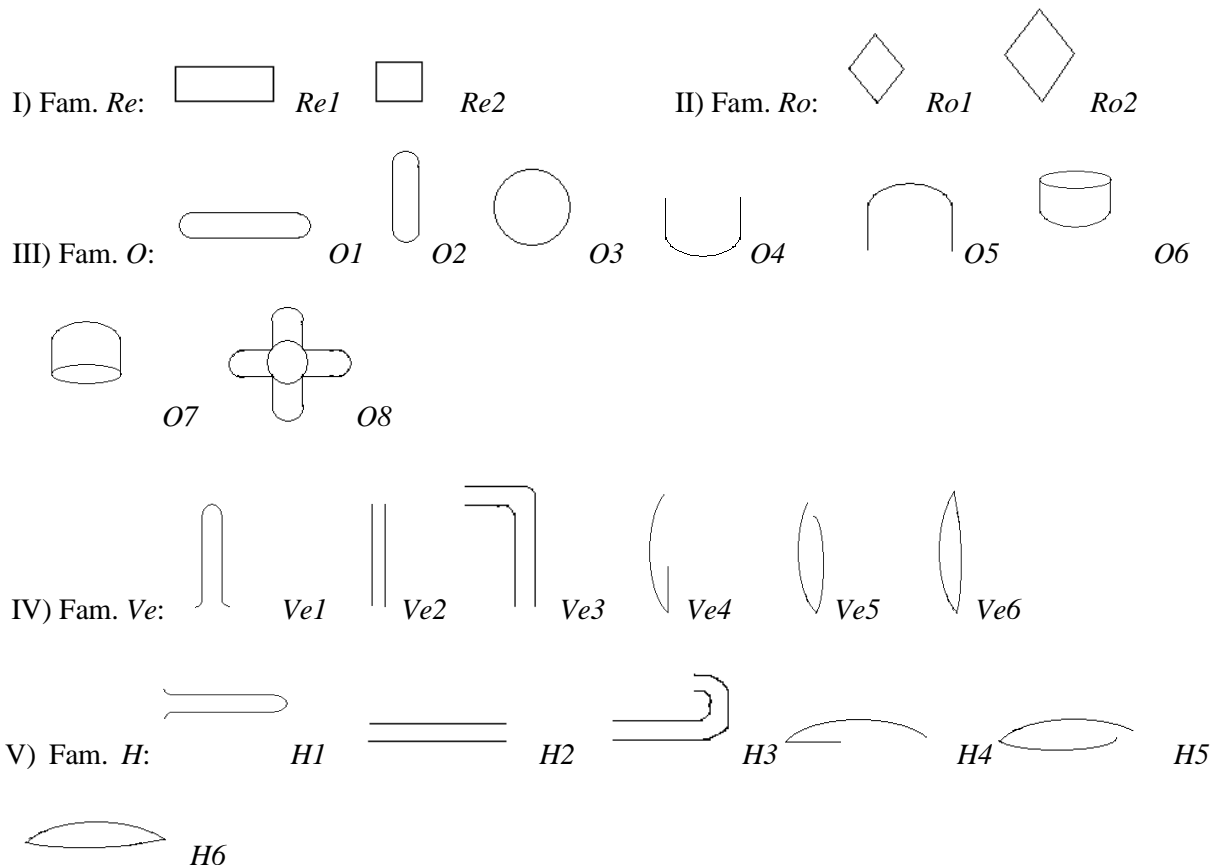
In order to identify and exemplify the way of applying certain grammars that generate codifications (characterizing an urban style existing in the capital of Romania), I chose the Brancovan style example (Note 1). Categories of an urban type (notated with A) contain the components  $\{1, 2, 3, 4, 5, 6\}$  that have a Brancovan style. In the paper, we have used elements pertaining to the theory of formal language theory. The non-terminal alphabet contains the following types of geometrical forms: rectangular, rhombic, oval (round), vertical, horizontal, equilibrated, as well as some artifacts (archways, semi-archways, a. s. o.). The latter type also includes the seven varieties characterizing the topological theory of dynamic systems which were studied by the French mathematician René Thom (the fold catastrophe, the cusp catastrophe, the swallowtail catastrophe, the butterfly catastrophe, the elliptic ombilic, the hyperbolic ombilic). Those forms can be applied in the case of some buildings with modern architecture. The following seven geometrical families are taking shape, and they are notated with  $\{Re, Ro, O, Ve, H, Se, V\}$ : 1. Rectangle  $\{Re1\}$ ; Square  $\{Re2\}$  (rectangular, *Re* family (two elements)); 2. Rhombus  $\{Ro1\}$ , Parallelogram  $\{Ro2\}$  (rhombic-parallelogram, *Ro* family (two elements)); 3. Horizontal ellipsis  $\{O1\}$ , Vertical ellipsis  $\{O2\}$ , Circle  $\{O3\}$ , Oval form with its basis directed downwards and open upper end  $\{O4\}$ , Oval form with its basis directed upwards and open bottom end  $\{O5\}$ , Oval form with its basis directed downwards and circular (spatial) upper end  $\{O6\}$ , Oval form with its basis directed upwards and circular (spatial) bottom end  $\{O7\}$ , Floral form  $\{O8\}$ (oval (round), *O* family (eight elements)); 4. Vertical closed curves and open curves  $\{Ve1, Ve2, Ve3, Ve4, Ve5, Ve6\}$  (vertical, *Ve* family (six elements)); 5. Horizontal closed curves and open curves  $\{H1, H2, H3, H4, H5, H6\}$  (horizontal, *H* family (six elements)); 6. Spatial surfaces  $\{Se1, Se2, Se3, Se4, Se5, Se6\}$  (equilibrated, *Se* family (six elements)); 7. Archway  $\{V1\}$ , Semi-archway  $\{V2\}$ , Fold  $\{V3\}$ , Cusp  $\{V4\}$ , Swallowtail  $\{V5\}$ , Butterfly  $\{V6\}$ , (variety, *V* family (six elements)).

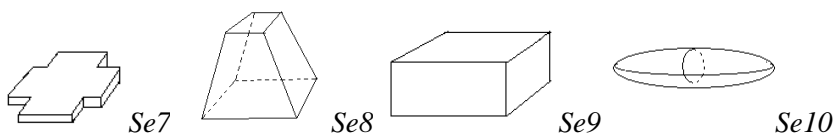
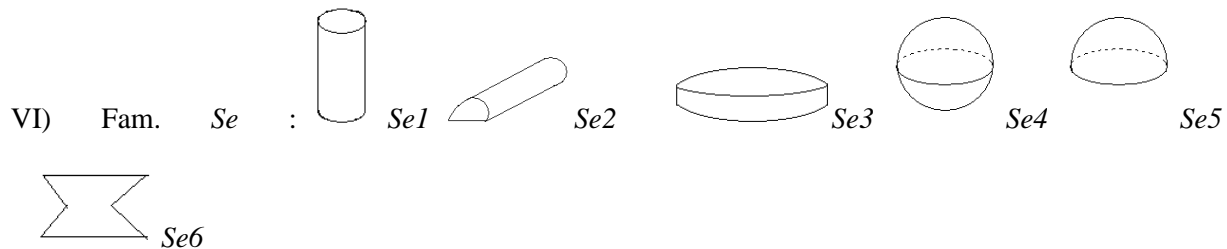
Note 2

**Formal language:** *Alphabet* – is represented by a finite set of entities and is notated with letter  $A \neq \emptyset$  (void set). Its elements are named *symbols (letters)*, and their number is notated with  $\#(A)$  or  $\text{card}(A)$ . *Word* (formed out of the letters of the considered alphabet) - is represented by the finite succession of symbols (sometimes also named letters). It is considered to be the zero symbol or it is supposed to be formed of several letters of  $A$ , successively written; a symbol may emerge several times  $\{A = \{a_1, a_2, \dots, a_n\}$ , sequence  $c = a_{i_1} a_{i_2} \dots a_{i_k}$  represents a word, where  $a_{ij} \in A, j \in [1, k]\}$ . The length of the word  $c$  is notated with  $l = |c|$ . The null length succession is notated by (*eps*);  $|c|_B$  is designating the length of the word obtained from  $c$  by erasing the symbols (letters) that do not emerge in a certain alphabet  $B$ .  $|c|_a$  – designates the number of emergences of letter  $a$  in the word  $c$ , the set of all non-void words formed out of the letters of a certain alphabet is notated by  $A^+$ , and the set of all words formed out of the letters of a certain alphabet is notated by  $A^*$ . *Concatenation* of the words  $c_i$  and  $c_j$  is put into evidence by the juxtaposition  $c_i c_j$ . The sub-word  $w$  of the word  $c$  exists if there are words of the form  $u$  or  $v$  for which  $c = uwv$ . Subsets of  $A^*$  designate a formal language formed out of the letters of alphabet  $A$ . Generative mechanisms of formal languages represent *grammar*  $G = (A, B, S, P)$ , where  $A$  and  $B$  are two non-void and disjoint alphabets; their symbols (letters) are named non-terminal (for alphabet  $A$ ), and terminal (for alphabet  $B$ ), respectively. The alphabet of non-terminals contains the non-terminal notated with  $S$  which represents the grammar axiom, while terminals are notated with small letters.  $P$  represents a finite set of *rules of production*, written in the form in which  $c$  *implies*  $d$ . The *derivation* relation is defined for two words  $a$  and  $\beta$ . *The regular language* is the one which is recognized by a finite automated device (operated in the sense given by Kurt Gödel).

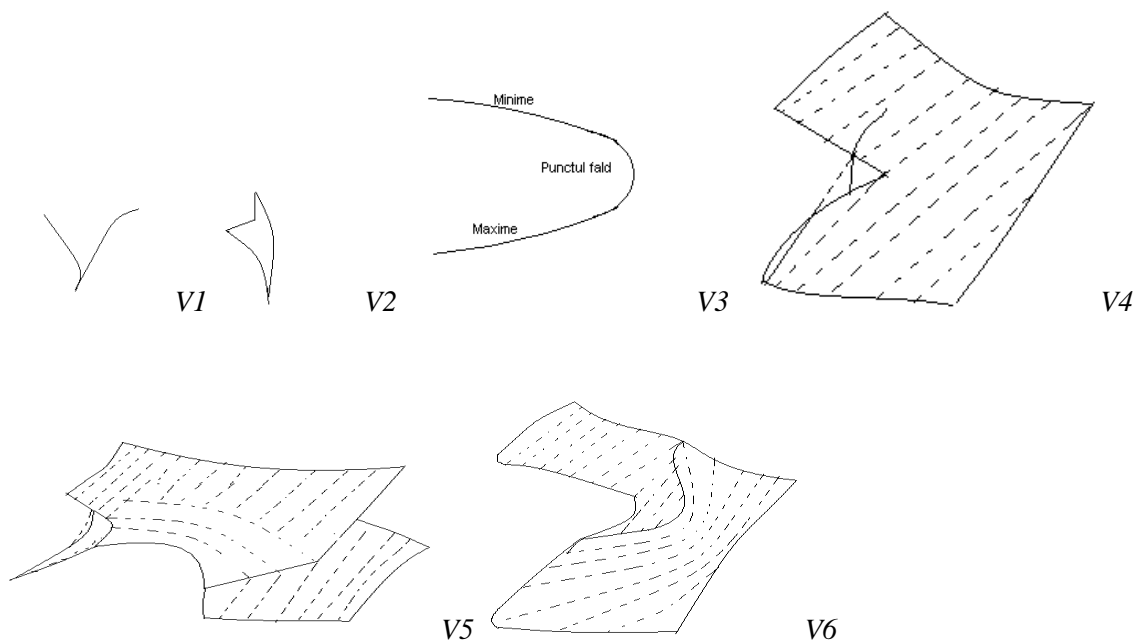
In order to use the notions presented in the paper under Note 1 (those notions pertain to a certain formal language that can be used in linguistics, artificial intelligence, (non-determinist) finite automated devices, aso.) the former have been adapted. Those notions can be applied also in order to make an analysis of general architectural styles with a level other than the Brancovan style. One should, however, introduce (in the “alphabet”) the primary elements pertaining to the analyzed style.

**Geometrical families {Re, Ro, O, Ve, H, Se, V}:**





VII) Fam. *V*:



The words formed by means of the letters of the considered alphabet describe the significances of the symbols, as well as the structure of sentences (formed afterwards). Most of them can also have a plural form. The initial symbol is notated with *S*. The words are the following:

S, <platband>, <archivolt>, <arch>, <apse>, <archway>, <altar>, <pulpit>, <roof>, <(pointed) vault>, <balcony>, <bulwark>, <corbel>, <stone bench>, <(church) body>, <component>, <column>, <(pendant) cupola>, <cap>, <choir>, <counterfort (abutment)>, <capitol>, <arch bond>, <lateral chapel>, <colonnade>, <belfry (steeple)>, <fortress>, <console>, <(stone) framing>, <cell>, <key block>, <exonarthex>, <form>, <foundation>, <rectangular form>, <rhombic form>, <oval form>, <vertical form>, <horizontal form>, <equilibrated form (surface)>, <mathematic form (variety)>, <mathematic forms (varieties)>, <fortification>, <fresco>, <façade>, <window>, <fountain>, <fort>, <gothic window>, <Roman frieze>, <watch tower>, <nook(recess)>, <gang>, <protection grating>, <wattle-work>, <enclosure>, <lapidary>, <monument>, <rampart>, <(gothic) motive>, <niche (in the wall)>, <(central, lateral) aisle>, <nave>, <(gothic) arch rib>, <ornamentation>, <(arched) layout>, <pedestal>, <painting>, <pilaster>, <narthex>, <portal>, <church porch>, <portico>, <rectangular plane>, <trapezoidal plane>, <panel>, <tombstone>, <register>, <petal rose window (Catherine wheel)>, <structure>, <bolstering up>, <bracket (holder)>, <plinth>, <sculpture>, <pillar>, <pew>, <stairs>, <eaves>, <(lateral) tower (with a loggia)>, <octagonal>, <church spire>, <transept>, <ceiling>, <turret>, <basement>, <step>, <bay>, <(vaulted) door>, <wall painting (white washing)>, <variety>, <wall>

The meta-symbol „/” is used for the conjunction ”either ... or” and it generates the writing in the compact form of product rules. The meta-symbol ” → ” is used for the verb „implies”.

The grammar products pertaining to the formal language (provided that the meta-symbols „<” and „>” represent the Chomsky form parentheses within the convention Backus/Naur) are chosen as shown below. The symbol „ζ” is equivalent to the word „anything”. Derivation takes place as follows: for the beginning, we shall consider the succession formed only of the initial symbol „S”, the process is continued by replacing any non-terminal word by a new word succession, provided that the respective products belong to the considered formal language grammar. The operation continues till all the words belonging to the newly obtained succession will represent terminal words, a situation when no other product can be any longer applied. In this way, we can conclude that the adopted grammar shall generate a language which is proper to a certain architectural „space”.

S → <foundation> <basement>

<basement> → <rectangular plane> <trapezoidal plane>

<foundation> → <structure> <pedestal>

<structure> → <wall> <façade> / <bracket (holder)> <plinth>

<pedestal> → <bracket> <plinth> / <bay> <bracket> / <pillar> <pilaster> / <plinth> <column> / <column> <capitol> / <arch bond> <portico> / <colonnade> <turret> / <(octagonal) lateral loggia tower> <turret>

<wall> → <bolstering up> <console> / <nook> <niche> / <counterfort> <bracket> / <church porch (exonarthex)> <narthex> <central aisle> <lateral aisle (transept)> / <nave> <altar> / <lateral chapel> <tombstone> / <body (church)> <monument> / <rampart> <fortification> / <stone bench> <stone framing> / <cell> <fountain> / <stair> <step> / <vaulted door> / <watch-tower> <bulwark> / <window> <gothic window> /

<ceiling> <painting (whitewashing)> / <roof> <eaves> / <apse> <enclosure> / <bulwark> <fortress> /  
 <protection grating> <lapidary> / <arch> <archway> / <(pointed) vault> <(pendant) cupola> / <cap> <arch rib>  
 / <key block> <gang> / <church spire> <belfry> / <pew> <pulpit> / ζ

<façade> → <register> <petal rose window (Catherine wheel)> / <painting> <fresco> / <ornamentation>  
 <panel> / <motive> <ornamentation> / <painting> <sculpture> / <corbel> <wattle-work> / <layout> <platband>  
 / <platband> <archivolt> / <Roman frieze>

<component> → <form> <mathematical form (variety)>

<mathematical form (variety)> → <mathematical form (variety)> <mathematical forms (varieties)> / ζ

<form> → <rectangular form> / <rhombic form> / <oval form> / <vertical form> / <horizontal form> /  
 <equilibrated form (surface)> / <mathematical form (variety)>

<rectangular form> → Re1 / Re2

<rhombic form> → Ro1 / Ro2

<oval form> → O1 / O2 / O3 / O4 / O5 / O6 / O7 / O8

<vertical form> → Ve1 / Ve2 / Ve3 / Ve4 / Ve5 / Ve6

<horizontal form> → H1 / H2 / H3 / H4 / H5 / H6

<equilibrated form (surface)> → Se1 / Se2 / Se3 / Se4 / Se5 / Se6 / Se7 / Se8 / Se9 / Se10

<mathematical form (variety)> → V1 / V2 / V3 / V4 / V5 / V6

The Romanian Patriarchal Cathedral, Kretzulescu Church, Our Lady's Church (Doamnei Church), Stravropoleos Church, Coltea Church, Antim Monastery represent six Romanian cult edifices built in Brancovan style that generate non-terminal forms, as well as terminal forms. Taken into account they had been built during the period 1656 – 1724, terminals can be found only within a segment of Fam.  $V \{V1, V2\}$ , and so, they can be considered as discontinuities, since they are in number of 0, 1, 2 (there are no discontinuities reported /or/ a unique discontinuity is reported /or/ there are two discontinuities reported). Also, we can find all terminals pertaining to the rectangular, rhombic, oval, vertical, horizontal form, to the equilibrated (surface). The alphabet of non-terminals contains the one notated with  $S$  (the grammar axiom), as well as all words generated by the products of the formal language grammar. Generally speaking, since terminals are the same for all considered edifices, the paper doesn't analyze each case. Below is shown the matrix of emergences of terminal alphabet elements in the six situations. The lines of the matrix correspond to the considered edifices, while the columns of the matrix correspond to the terminal alphabet components. The approximate number of emergences of „j” element (terminal symbol) of the respective edifice is to be found at the conjunction point of line „i” with column „j”.



s-aesthetic sensation / e-aesthetic excitation (generated by the stimulus), k-proportionality factor,  $s_0$ -constant value (obtained by integration of the rel. (1)),  $e_0$ -initial aesthetic excitation

It results:  $\int ds = k \int de / e = k \ln e$ , the integration limits being  $s$  and  $s_0 / e$  and  $e_0$ .

We obtain:

$$s - s_0 = k \ln (e / e_0) \quad (2)$$

“s” may represent the aesthetic sensation generated by a certain urban “quality”, by a certain urban “stimulus” that have an aesthetic and an anthropological level, while “e” represents the aesthetic and anthropological excitation. The value “k” may be determined on physical grounds of a chromatic order (the white light and the colors are electromagnetic waves).

We may consider that any aesthetic representation of a town-planning level is unique, and is the singular eliminant (resultant) of certain revelations or of certain interpretations and imaginative associations. That representation is useful for the informational aesthetics, since it generates the issue of measure and of subjective redundancy. On the other hand, non-redundancy refers to the aspect that is considered unprecedented - generated by an information flow having an aesthetic and anthropologic level. If redundancy refers to well-known aesthetic aspects that do not offer any innovation, the non-redundant aspect represents its contrary.

An ”operation form” can be adapted for the analyzed case.

If aesthetic redundancy is notated with “ $\mathbb{Y}$ ”, the following expression is significant:

$$\mathbb{Y} = (E_{\max.} - E_{\text{ef.}}) / E_{\max.} = 1 - E_{\text{rel.}} \quad (3)$$

$E_{\max.}$  – maximal aesthetic information,  $E_{\text{ef.}}$  – effective aesthetic information,  $E_{\text{rel.}}$  – relative aesthetic information

$$E_{\text{rel.}} = E_{\text{ef.}} / E_{\max.} \quad (4)$$

Taking into account that the information having an aesthetic level is generated by the stimulus and the level of variation of the latter is shaped by means of the relations (1) and (2) (Weber-Fechner), we obtain:

$$\mathbb{Y} = (E_{\max.} (s) - E_{\text{ef.}} (s)) / E_{\max.} (s) = (E_{\max.} (s_0 + k \ln (e / e_0)) - E_{\text{ef.}} (s_0 + k \ln (e / e_0))) / E_{\max.} (s_0 + k \ln (e / e_0)) \quad (5)$$

which is written according to the expression  $\delta (e) = s_0 + k \ln (e / e_0)$  (6), whose notations have been already developed in the paper.

The non-redundant information flow shall have to contain the expression *non* ( $\mathbb{Y}) \neq \mathbb{Y}$  (7), for which the aesthetic perception having an anthropologic level exists in a „pure” state. Thus, it is generated an innovative value of the aesthetic message considered to be, as a requirement, the least redundant possible, with a tendency towards non-redundancy. The expression identified in the paper can be applied to the symbolic perception having an aesthetic level characterizing certain competitive spaces in Bucharest (Romania) and can be generalized. The maximal / effective aesthetic information is also compatible to the (maximal / effective) informational entropy and can be analyzed based on this criteria. Taking into consideration that the possibility of the Being’s conscience to perceive is of approximately (10-20) bits / sec., we deduct that the urban aesthetic information flow should be superior to that value, and the semantic information (in the

semiotic sense) should be inferior. At the urban level of the metropolises and hyper-metropolises, it is considered that the aesthetic information comes into being during the process of forming the perception of architectonic super-images (out of different groups of component sub-images). The above-mentioned process is dynamically developing according to certain parameters (size, complexity, level of aesthetic grounding, etc.), and it shall always imply a certain lapse of time. The measure of the aesthetic perception is directly proportioned to the “order” existing within an architectural work and in inversely proportioned to its level of complexity (G. T. Fechner).

The notion of **informational aesthetic psychology at urban level** may be implemented (in a future analysis), and the results, the approaches implemented (for the first time mentioned in the current paper, and communicated within a congress) may prove to be useful. In this context, we can use notions such as “temporary deposit of the awareness of urban aesthetic and anthropologic perception”, “subjective redundancy of an aesthetic and anthropologic order having an urban level”, “collecting the urban aesthetic-anthropologic information”, “informational adaptation of an urban aesthetic and anthropologic level”, “coding of an urban aesthetic and anthropologic level”, “urban aesthetic and anthropologic randomization”, etc.

***b3) Qualitative relationship existing between “spaces” that have a micro-structural / macro-structural topology, between natural / artificial “spaces”***

The town space of Bucharest city (Romania) represents the figural / symbolic framework that should be continuously rearticulated, from the semiotic point of view. By *macro-structure* we understand (in this case) a “diagram” of general characteristics, of essential relationships among the former. The joints of the forms imply the *micro-structure*, the analysis of the rhythmic and harmonic developments: we may distinguish within main/secondary themes some “scales” having a key note and a dominant note. Some perceptual and congruent tensions are generated, thus achieving the identification of some connections within the respective space, connections that must be melted with natural structures and processes, with the psychic life flow, as well as with the cosmic rhythm. Abstract art, implied in the quality relationship between “natural” and “artificial”, generates the multitude of codes and symbols of a topologic, “microphysical” and biologic nature. The “macro-aesthetic” status (implied by the macro-structural geometry (topology), order and complexity) generates sensorial observation and perception. The “micro-aesthetic” state (implied by the micro-structural geometry (topology), order and complexity) represents in our opinion, a system of aesthetic elements characteristic to the considered monument, in its integrally “macro-structural” form. This is (as a matter of fact) a “sign”, following a global, non-segmented symbol. The architectonic sense in Bucharest comprises the relationships between expansion and contraction, dominance and subordination, conflict and concurrence, approach and amplitude, rising and fall. Between each of the two statuses can be identified a qualitative relationship.

As M. Bense was remarking, the aesthetic state is characterized by natural, as well as artificial “carriers”, by the existence of “spaces” which have that structural quality. In the respective framework, also of some significance for Bucharest are certain bi-dimensional architectural structures (the green areas). Currently, those areas are spreading on a surface of 34,2 million square meters, out of which 6,7 million square meters are represented by parks and gardens, 6,0 million square meters are represented by the neighboring woods, and 4,9 million square meters represent the street green stretches. They form a total “range” of 14,86 square meters of green area / inhabitant and respectively 0,15 square meters of green area corresponding to one square meter of the effective surface (15 %). If we bear in mind that in some European metropolises, the green area allocated to an inhabitant is larger (Stockholm: 83 square meters of green area / inhabitant, London: 64 square meters of green area / inhabitant, Warsaw: 32 square meters of green area / inhabitant), it will result that **in the capital city of Romania, this aspect will have to be optimized.** Elements of the graph theory may also be used; restrictions are determined by a graph having one point for each architectural objective, where the side of the latter corresponds to the required adjacent, that we may



consider to comprise the green area, too. We may also attach to the latter a certain significance level. It is possible to consider the green area, also as a supplementary knot in the graph, and to add supplementary sides, in order to mark different providing requirements.

## Conclusions

### c) Forms of urban symbolism identified in Bucharest (Romania)

We have identified some “symbolic” architectural “spaces” in the capital city of Romania, Bucharest (a). We have analyzed, by means of mathematical languages (instruments) and generative grammars, the mechanisms that may be applied to some families of architectural buildings. As an example, we have chosen the Brancovan style case, which is characteristic to certain confessional monuments in Bucharest city. We have identified the terminal language, the typology of grammar categories, as well as a partition matching the former (b). We have developed the form of aesthetic redundancy, as well as its implicit aspect, the non-redundancy (the first relation of that type obtained in the specific scientific texts. We have identified the quality relationship existing between “spaces” having a micro-structural topology and the ones having a macro-structural topology, between the natural and the artificial “spaces” characteristic to Bucharest city.

The current paper implies numerous interdisciplinary requirements, which refer, in the first place, to the possibility to apply some new methods in order to obtain - by using generative grammars as well as formal languages – some simple forms (shaped like some graphic grammars), applicable to architectural urbanism, to the representative buildings in the capital of Romania.

Annex

According to some current architecture dictionaries, the words considered in the paper have the following significance:

<**platband**>: relief decorative framing (rib) that surrounds a door, a window; <**archivolt**>: ornamental detail existing above an arch, a window, a door; <**arch**>: element of a bowing form that connects together two walls or two columns; <**apse**>: semi-circular or polygonal niche that closes the central aisle of a Roman basilica, designed for the altar; <**archway**>: architectural element consisting of one or more arches and of the elements supporting the former (columns, pillars, walls); <**altar**>: part of a church connected to the nave by the iconostasis, where the mess is celebrated; <**pulpit**>: (balcony-like) element inside a church, where the priest preaches or reads the Holy Scriptures ; <**roof**>: upper part covering and protecting a building from severe weather; covering; <(pointed) **vault**>: construction or building with a bowing upper part in the form of a semi-circle or only with an upper round protuberance <**balcony**>: platform (with a protuberant balustrade) placed on one of the sides of the building and communicating with the interior; <**bulwark**>: fortification work in the form of a tower (of short stature and strong) with two flanks and two faces and representing a strong point of support; <**corbel**>: ornament that surrounds the doors, windows, façades of a house; <**stone bench**>: stone element, with or without a back, designed for more persons sitting on it at the same time; < **body** (church)>:edifice specially built and designed to celebrate the Christian cult; <**component**>: element characterizing the structure of a body; <**column**>: cylinder pillar made of marble, stone, wood, etc., designed to partly support or embellish an edifice; <(pendant) **cupola**>: semi-sphere, polygonal or elliptical element that represents the covering of a dome, of a spire or of an edifice, and having as architectural elements a spherical triangle with its end directed downward, placed in the corners of big arches that support the cupola or the spire; <**cap**>:each of the two segments resulted from the cutting of a sphere by means of a plane (a semi-sphere); <**choir**>: the total number of the (central/lateral) aisles of a (usually catholic) church; <**counterfort (abutment)**>:massive corner bracing built in concrete/brickwork in the form of a *pilaster* (a parabolipiped provided with a *base* (total number of the resistance elements supporting a building, equivalent to the basement or foundation) and a *capitol* (upper part, decorated, thicker, required for consolidation)); the latter makes the connection with the *architrave* (building element representing the bottom part of the (*entablature*) (structure supporting the roof)); <**capitol**>: upper part, thicker and decorated, of a column or a pilaster, that makes the connection with the trunk of that building (placed above the basement) and architrave; <**arch-bond**>: concave part of a vault or of an arch; <**lateral chapel**>: lateral altar of a church; <**colonnade**>: small, slender column; <**belfry(steeple)**>: building in the form of a tower (placed next to the church) for the bells; <**fortress**>: place reinforced by means of a defense works system; fortress; <**console**>: architectural (ornamental) element built in wood, stone, etc., used to support a *cornice* (upper protuberant, decorated part of a building wall that has the role to support the roof and to prevent rainwater from running down on the façade of a building or may represent a *molding* (a

decorative, relief element built on the surface of a wall) which is prominent, surrounds an entablature and has the decorative role) on a balcony, etc.; <(stone) **framing**>: framing (worked, with drawings, with stone sculpture, etc.) that surrounds an object and usually has the role of an ornament; <**cell**>: room to live in; <**key block** (or arch)>: arch brick (piece of stone or concrete specially designed for vault building), usually decorated, placed in the highest point of a vault or of an arch, with the role of completing the building and of supporting the other arch bricks; <**exonarthex**>: *church porch* (room at the entrance of a church that precedes the narthex) open towards the Western side of the Christian basilicas; <**foundation**>: element or ensemble of building elements serving as a support or supporting basis of a building; equivalent to a foundation, a ground or a basement; <**rectangular form**>: geometric form or contour whose most angles are right; <**round form**>: geometric form or contour whose most of configurations are round (in circle); <**slender form**>: architectural form showing grace and elegance; <**vertical form**>: geometric form or contour whose most forms are vertical; <**horizontal form**>: geometric form or contour whose most forms are horizontal; <**fortification**>: defense building made of clay, stone (with the role of a church), of concrete steel; <**fresco**>: painting technique that uses colors dissolved in lime water on a wall having wet ground coat to obtain mural painting (it adheres to the wall it is executed on), decorative, large-sized; <**façade**>: each of the exterior sides of a building, of a monument; <**window**> regular form breach in the wall of a building letting the air and the light in; ensemble formed of a fixed framework and of sashes where window panes are mounted in the above-mentioned breach; ensemble formed by that breach together with the sashes framing it and with the window pane fixed in the sashes; <**fountain**>: building made of wall, stone, etc. that shelters a water source (coming from a certain hydraulic network) and serving to distribute water or as an architectonic decorative element (inside churches, in the parks, etc.); <**fort**>: fortification work built in the wall, with a polygonal contour that is part of a bracing system and designed to defend an important center (sometimes, a church) or a strategic line; <**gothic window**>: window of a church built in *gothic style* (architectural style that occurred in the XII<sup>th</sup> century in Western Europe, characterized by: predominant high, slender architectonic forms, with ogival and arched vaults (building system characterizing gothic architecture, formed by the junction of two circle arches diagonally placed, that form the structure of a vault), by counterforts, by different stained glass windows (large windows with several partitions, bounded by metallic frames, with windows colored or painted in lacquer), by a large number of stone sculptures); <**Roman frieze**>: part of an entablature between the architrave and the cornice, usually decorated with paintings and sculptures and representing a continuous horizontal strip, placed at the upper part of an edifice or above the wall paper (art buildings have a Romanic style in the European countries, as they have been under the Catholic influence of the X<sup>th</sup> - XIII<sup>th</sup> centuries; it has taken over characteristics of the Byzantine art and elements of the Carolingian art (severity, massiveness, robustness, prismatic and cylindrical volumes both for the aisles and apses/towers); <**watch tower**>: open terrace (much above the ground), with the roof supported by pillars or columns; veranda, porch; it also represents a belfry built separately from the church; <**nook (recess)**>: arched cavity in the upper part of a wall, with a decorative or utility role; it represents a niche, a cavity in the wall; <**gang**>: passage under a building, under the vault of a house; <**protection grating**>: device made of an ensemble of metal supporting rods mounted on a structure, in order not to allow any foreign body or entity to pass through (defense); <**wattle-work**>: joining together of certain elements, by alternatively adding elements and in a certain manner; <**enclosure**>: a space closed from all sides (within a building); <**lapidary**>: place where large, sculpted, engraved stones are kept (bas-reliefs, statues, tombstones, etc.); <**monument**>: architectural or sculptural art in memory of a significant event or of an illustrious person representing a valuable historic moment; <**rampart**>: fortification, defense wall; <(gothic) **motive**>: decorative or architectural (gothic) element used in a painting or a sculpture; <**niche** (in the wall)>: (rectangular, arched, etc.) recess, voluntarily left in a wall, where decorative objects are usually placed; nook; <(central, lateral) **aisle**>: central space (nave (between the altar and the narthex)) or a space in the lateral side of an orthodox church; <**nave**>: main part of a church, placed in the middle of the building, between the altar and the narthex; aisle; <(gothic) **arch rib**>: each of the moldings that form together the main structure of a (gothic (or Roman)) vault, giving contour and decorating the borders of a vault, or of a niche; <**ornamentation**>: characteristic of a style concerning ornament concept and disposition in architecture and applied art; <(arched) **layout**>: way in which are arranged the elements (arches) of an architectural composition; <**pedestal**>: substructure, basis supporting a statue, socle, plinth; <**painting**>: branch of the applied arts representing reality in bi-dimensional artistic images created by means of colors applied on a flat surface (cloth, paper, wood, glass, etc.); <**pilaster**>: parallelepipedal pillar usually having a basis and a capitol and serving as an ornamentation or consolidation element of a wall; <**narthex**>: first room placed at the entry of the sanctuary of a temple; it precedes the entry to the nave of the church; <**portal**>: monumental entry to an edifice with a richly ornamented framing (usually, a stone, wall or wooden cornice); <**church porch**>: room at the entrance of a church that precedes the narthex; <**portico**>: exterior gallery bordered by a colonnade (a series of columns arranged in one or more ranges and forming an architectural ensemble, sometimes with arches) that serves as a shelter or walking lane around a square, a building, etc. or as a monumental entrance in an edifice; <**rectangular plane**>: flat rectangular form containing effigies whose elements are placed in the same plane; <**trapezoidal plane**>: flat trapezoidal form containing effigies whose elements are placed in the same plane; <**panel**>: segment of a wall or ceiling distinguished from the rest by elements of sculpture, stucco or painting; <**tombstone**>: gravestone or monument placed on a tomb; <**register**>: surface between two horizontal profiles that spread all over a façade; it also represents each of the zones that compose a decorative surface; <**petal rose window (Catherine wheel)**>: circular large window with stained glass that has the configuration of a petal-structure placed on the façade of gothic cathedrals, above the entrance door; <**structure**>: ensemble of building elements forming one piece with another, that takes over all charges it has to bear and conveys them to the foundation; <**bolstering up**>: propping up, suspension, support (of a building provided with pillars); <**equilibrated form (surface)**>: well-proportioned surface; <**bracket (holder)**>: object supporting something, specially designed to this purpose; <**plinth**>: bottom part of a building; it represents the pedestal that supports a column, a statue; <**sculpture**>: the art of plastically representing in a tridimensional way, the living forms of nature, different ornaments; <**pillar**>

building element, long and thick, made of wood, metal or reinforced concrete, that vertically supports something; <**pew**>: each of the chairs placed on the right and left sides of the iconostasis (wall covered with icons that separates the altar from the rest of the church), also named rood-screen, spreading over the walls of the nave; on those chairs believers will sit during the mess celebration; it also represents the part reserved to the church singers, where there usually is a book stand; also representing a small table on which an icon is placed; <**stairs**>: element of a cult building (church) composed of a succession of steps and serving to communicate from one level to another; <**eaves (window roof)**>: prolongation of the roof over the upper edge of the walls of a building that it protects from the rain water; <**lateral (octagonal) tower with a logia**>: prismatic, octagonal or cylindrical building, either separately built or being part of an architectural complex; usually higher than the other buildings and having a skillful composition secondary element (*logia*); <**church spire**>: polygonal cylindrical or prismatic building, relatively high, that is part of the architectural complex of churches and rises over the roof; <**transept**>: transversal nave that cuts in a right angle the main nave of a church and forms together with it a cross plane; <**ceiling**>: inner surface of the upper floor of a room; <**turret**>: small sized tower; <**basement**>: bottom part of a building, column, statue, etc., by means of which the former supports itself against the ground; foundation, basis, ground; <**step**>: each of the horizontal surfaces having a relatively small width, and placed at different heights, at equal distances, that make a stair; <**bay**>: part of a building that comprises two supporting points and the opening between them; also a part of a vault between two supporting brackets; <**vaulted door**>: opening in the form of a vault or an arch made in the wall of a building, that facilitates entrance inside the latter; <**wall painting (whitewashing)**>: covering the walls of a building or a room with a solution containing water and lime mixed up with clay (as well as with different dyeing agents), sometimes also with drawings that imitate wall paper; <**variety**>: term used in mathematics (in n-dimensional differential geometry, and symbolizing a multi-dimension surface); <**wall**>: building element, vertical or of a slightly oblique setting, with a (relatively) small width as compared to the other dimensions, made of bricks, stone blocks, etc., piled in an orderly way (and bound together by means of a binding agent) or made of concrete, designed to set boundaries, separate or isolate a space or support other building elements and making a wall, an enclosure, a fortification.

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