

4. SEMIOTIC MODELLING THE RECONSTRUCTIONS

These are the related with the reconstruction problem of graphs, which is well-known as the *Ulam's Conjecture* [Ulam]. The latter has deserved at the 1946th the attention of many investigators to this day. Unfortunately, it lacks a general and elegant solution acceptable to everyone yet. But it is considered to be solved for the separate graph types. Below I will try to present their position on this issue.

4.1. Relationships between isomorphic graphs and their $(G \setminus v_i)$ -sub-graphs

Here is suitable to begin with a theorem, proved by A. Titov in 1975 [Titov].

Titov's theorem. If all the $(G \setminus v_i)$ -sub-graphs of graph G are isomorphic, then automorphism group $AutG$ is transitive on the set of vertices V .

Comment: It mean that graph G is *transitive* or *vertex symmetric*, i.e. there exists only one vertex orbit $\Omega V_{k=I=K} = \Omega(v_{i=I}, \dots, v_{i=V})_{k=I=K}$, which correspond just to one isomorphism class of $(G \setminus v_i)$ -sub-graphs, $\Gamma_{k=I=K} = (G \setminus v_{i=I} \cong \dots \cong G \setminus v_{i=V})_{k=I=K}$.

There we return anew to problems of the relationships between *equal positions* and *remaining graphs* (Prop. 2.7) and relationships between *automorphisms*, *local isomorphisms*, *orbits* and *semiotic invariants* (Prop. 2.8). Indeed, vertex orbit $\Omega V_{k=I=K}$ is a *transitivity domain of automorphisms in $AutG$* that be expressed by an isomorphism class $\Gamma_{k=I=K}$ of $(G \setminus v_i)$ -sub-graphs and is represented in the form of an *position (class)* of vertices S_k in semiotic model S .

Example 4.1. *Equivalent semiotic models SM_A and SM_B of isomorphic graphs G_A and G_B* (see also Example 3.8):

$$A: -2.8.21; \quad B: -2.7.16; \quad C: +2.4.5; \quad D: +2.5.7$$

1	2	3	6	7	8	4	5	i	ABCD	k	12	2	3	4	5	6	7	1	8	i	ABCD	k	12
0	-B	-B	C	C	C	D	D	1	0232	1	32	0	C	-B	-B	C	C	D	D	2	0232	1	32
	0	-B	C	C	C	D	D	2	0232	1	32		0	C	C	-B	-B	D	D	3	0232	1	32
		0	C	C	C	D	D	3	0232	1	32			0	-B	C	C	D	D	4	0232	1	32
			0	-B	-B	D	D	6	0232	1	32				0	C	C	D	D	5	0232	1	32
				0	-B	D	D	7	0232	1	32					0	-B	D	D	6	0232	1	32
					0	D	D	8	0232	1	32						0	D	D	7	0232	1	32
						0	-A	4	1006	2	60							0	-A	1	1006	2	60
							0	5	1006	2	60									8	1006	2	60

Comment: Vertex positions (1, 2, 3, 6, 7, 8) and (4, 5) of G_A and vertex positions (2, 3, 4, 5, 6, 7) and (1, 8) of G_B .

Between a vertex ΩV_k orbit and $(G \setminus v_i)$ -sub-graphs be valid following relation.

Corollary 4.1. For each vertex position $\Omega V_k = \Omega(v_{i_1}, \dots, v_{i_q})_k$, $k \in [1, K]$, correspond an isomorphism class $\Gamma_k = \{(G \setminus v_i)_I \cong \dots \cong (G \setminus v_i)_q\}_k$.

We state that an isomorphism class Γ_k is practically an “isomorphism clique”, i.e. between all the pairs of $(G \setminus v_i)$ -sub-graphs exists the isomorphism relation.

Example 4.2. Semiotic model $\mathbf{SM}_{A(i=1)}$ of to first vertex position corresponding sub-graph $G_A \setminus v_{i=1}$ of G_A and semiotic model $\mathbf{SM}_{B(i=6)}$ of to first vertex position corresponding sub-graph $G_B \setminus v_{i=6}$ of G_B :

$$A: -2.7.16; \quad B: -2.6.12; \quad C: -0.2.0; \quad D: +2.4.5; \quad E: +2.5.7.$$

1	6	7	8	2	3	4	5	i	ABCDE	k	123
0	C	C	C	C	C	C	C	1	00700	1	000
	0	-B	-B	D	D	D	D	6	02140	2	004
		0	-B	D	D	D	D	7	02140	2	004
		0		D	D	D	D	8	02140	2	004
			0	-A	E	E		2	10132	3	032
				0	E	E		3	10132	3	032
				0	-A			4	10132	3	032
				0				5	10132	3	032

6	2	4	5	1	3	7	8	i	ABCDE	k	123
0	C	C	C	C	C	C	C	6	00700	1	000
	0	-B	-B	D	D	D	D	2	02140	2	004
		0	-B	D	D	D	D	4	02140	2	004
			0	D	D	D	D	5	02140	2	004
				0	E	E	-A	1	10132	3	032
					0	-A	E	3	10132	3	032
					0	E		7	10132	3	032
					0			8	10132	3	032

Comments a) From equivalency of semiotic models conclude, that the sub-graphs by first vertex position $G_A \setminus v_{i=1}$ and $G_B \setminus v_{i=6}$ are *isomorphic*, i.e. these belong to *first isomorphism class* $\Gamma_{k=1}$. To this class belong consequently so $G_A \setminus v_{i=6} \cong G_A \setminus v_{i=7} \cong G_A \setminus v_{i=8}$ as also $G_B \setminus v_{i=2} \cong G_B \setminus v_{i=4} \cong G_B \setminus v_{i=5}$. **b)** Exactly such situation is in case of second vertex position, where form the isomorphism class $\Gamma_{k=2}$. Must it to prove!?

Proposition 4.1. With isomorphism of graphs G_A and G_B come with the *isomorphism of orbits*, $(\Omega V_k)_A \cong (\Omega V_k)_B$, $k \in [1, K]$, of these graphs.

NB! An orbit ΩV_k can be contains also only one element, such case called *trivial orbit*.

From isomorphism of orbits ensue according to Prop. 4.1 next proposition.

Proposition 4.2. From orbit isomorphism, $(\Omega V_k)_A \cong (\Omega V_k)_B$, $k \in [1, K]$, of isomorphic graphs G_A and G_B ensue the *isomorphism of isomorphism classes*, $(\Gamma_k)_A \cong (\Gamma_k)_B$, $k \in [1, K]$, where:

$$(G \setminus v_i)_A \subset (\Gamma_k)_A \text{ and } (G \setminus v_i)_B \subset (\Gamma_k)_B.$$

Comment: Isomorphism of isomorphism classes, $(\Gamma_k)_A \cong (\Gamma_k)_B$, of $(G \setminus v_i)$ -sub-graphs, that accompany with isomorphism of vertex orbits, $(\Omega V_k)_A \cong (\Omega V_k)_B$, constitute practically *an union of isomorphism classes* $(\Gamma_k)_A \cup (\Gamma_k)_B$, where exist also inter-class isomorphism $(G \setminus v_i)_A \cong (G \setminus v_i)_B$,

4.2. Ulam's Conjecture

Ulam's Conjecture [Ulam] is also known as the *reconstruction problem*. This problem has been over the past half century, one of under active consideration being graph theoretical problem, but the ultimate solutions have only some graph classes. Why so?

Reconstruction constitutes by Ulam's finding isomorphism relations between two graphs and their $(G \setminus v_i)$ -sub-graphs. These same relationships are treated in previous chapter 4.1 on the ground of vertex orbits and the corresponding isomorphism classes of $(G \setminus v_i)$ -sub-graphs.

The classical treatment of reconstruction, the well-known *Ulam's Conjecture* is formulated as follows: "Let graph G has p vertices v_i and H has p vertices u_i , with $p \geq 3$. If for each i , the sub-graphs $G_i = G \setminus v_i$ and $H_i = H \setminus u_i$ are isomorphic, then the graphs G and H are isomorphic".

Evidently be interested on the question: contain the collection of sub-graphs $G \setminus v_i$ of G enough information about graph G itself? Here is suitable remark that the enough information about a graph be contained in the sign matrix S^* .

If the graphs G and H are presented in the form of *sign matrices* S_G and S_H , then is recognizable their isomorphism or non-isomorphism (Prop. 3.2). In case of isomorphism $G \cong H$ we can assert by Coroll. 4.1, Prop. 4.1 and 4.2 that in case each k exist also isomorphism of sub-graphs G_i and H_i , $G_i \cong H_i$ – and vice versa.

As early as according to grand old man W.T.Tutte [Tutte] the solution of reconstruction problem must start just from *isomorphism classes*.

Corollary 4.2. Let graph G presented as semiotic model SM_G and graph H as model SM_H . Let graph S_G has k vertex orbits $(\Omega V_k)_G$ and graph H has k vertex orbits $(\Omega V_k)_H$. If in the case of each k are the partial semiotic models $(SM_i)_G$ and $(SM_i)_H$ of sub-graphs $G_i = G \setminus v_i$ and $H_i = H \setminus v_i$ *structurally equivalent*, then are both sub-graphs G_i and H_i , and initial graphs G ja H *isomorphic*.

Conclusion 4.1. Corollary 4.2 not more hypothesis, but trivial conclusion about this, what we already ken. What for treat the conjecture only on $(G \setminus v_i)$ -subgraphs, it is true also for *adjacent graphs, sign graphs and position structures*?

4.3. Modelling the adjacent structures – deconstruction

As we know, there exist two elementary operations with edges: 1) *removal an edge* $G \setminus e_{ij}$ give a *greatest sub-graph* G^{sub} of G ; 2) *addition an edge* $G \cup e_{ij}$ give a *smallest super-graph* G^{sup} of G . The greatest sub-graphs G^{sub} and smallest super-graphs G^{sup} both we have called *adjacent graphs* G^{adj} of graph G .

Proposition 4.3. If the edge operations f have been applied *disjunctively*, $\{(f_{ij})_1 \vee \dots \vee (f_{ij})_q\}_n$ to the vertex pairs of an pair orbit $\Omega R_n = \Omega(r_{ij1}, \dots, r_{ijq})_n$ of a graph G , then the disjunctive adjacent graphs of graph G form an *isomorphism class* $\Gamma_n = \{(G^{adj}_n)_1 \cong \dots \cong (G^{adj}_n)_q\}$.

All the graphs G^{adj} of an isomorphism class Γ_n have the same structure and represent an *adjacent structure* GS^{adj} of G is expressed by corresponding *semiotic model* S^{adj} .

For differentiate are the serial numbers of pair(-)orbits (i.e. “non-edge” orbits) denoted by $n^- \in \{1, \dots, N^-\}$ and pair(+)orbits (i.e. edge orbits) $n^+ \in \{1, \dots, N^+\}$, where $N^- + N^+ = N$.

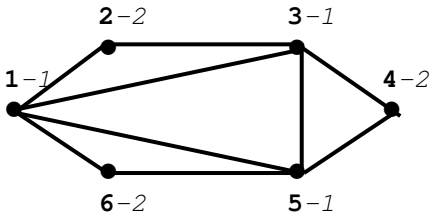
Definition 4.1. An edge operation that disjunctively transforms structure GS to an adjacent structure GS^{adj}_n is called *morphism* $F_n, F_n: GS \rightarrow GS^{adj}_n$.

Therefore, morphism $F_{n^-}: GS \rightarrow GS^{sup}_{n^-}$, that is applied to a *pair(-)orbit* ΩR_{n^-} of GS induce an *adjacent super-structure* $GS^{sup}_{n^-}$ of GS and morphism $F_{n^+}: GS \rightarrow GS^{sub}_{n^+}$ that is applied to a *pair(+)orbit* ΩR_{n^+} of GS induce an *adjacent sub-structure* $GS^{sub}_{n^+}$ of GS .

Corollary 4.3. Ratio $PF = \text{card}|\Omega R_n| : \text{card}|R|$, where $\text{card}|\Omega R_n|$ is the power of orbit and $\text{card}|R|$ is the sum of vertex pairs, specify the *translation- or morphism probability* PF to corresponding adjacent structure, $PF: GS \rightarrow GS^{adj}$.

Example 4.3. Graph structure *GS.37* (6.9.4) (by Graph Atlas [Read, Wilson] G163), its *adjacent super- and sub-structures* and Entry of identifiers of adjacent structures and characteristics of morphisms F_n :

A: -2.4.5; B: -2.3.2; C: +2.3.3; D: +2.4.5.



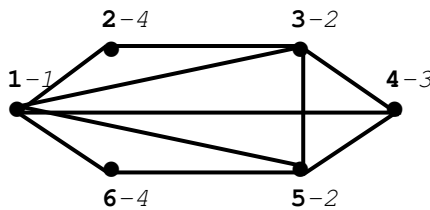
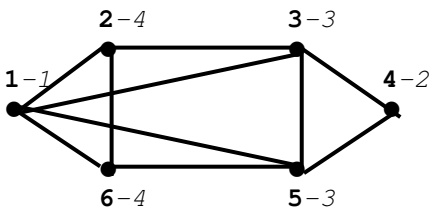
						k		
1	1	1	2	2	2			
1	3	5	2	4	6	i	ABCD	12
0	D	D	C	-A	C	1	1022	1 22
	0	D	C	C	-A	3	1022	1 22
		0	-A	C	C	5	1022	1 22
			0	-B	-B	2	1220	2 20
				0	-B	4	1220	2 20
					0	6	1220	2 20

	GS_n^{adj}	1	2
GS.37	GS_{n-}^{sup}	29	30
	$k.k'(p)$	2.2 (-B)	1.2 (-A)
	PF_{n-}^{sup}	3/6	3/6
GS.37	GS_{n+}^{sub}	72	76
	$k.k'(p)$	1.1 (+D)	1.2 (+C)
	PF_{n+}^{sub}	3/9	6/9

Here, GS_{n-}^{sup} and GS_{n+}^{sub} – a general range number adjacent structure; k,k' – index of partial semiotic model $SM_{k,k'}$, that contain pair position, where (p) to concretize the pair position in therein; PF_n – percentage of pair position or *morphism probability*.

Thus, *GS.37* has two *adjacent super-structures*, one by pair position $-B$, $GS_{n=-B}^{sup}$, and second by pair position $-A$, $GS_{n=-A}^{sup}$, and two *adjacent sub-structures*, one by pair position $+D$, $GS_{n=+D}^{sub}$, and second by pair position $+C$, $GS_{n=+C}^{sub}$.

Adjacent super-structures by pair position $-B$, $GS_{n=-B}^{sup}$, (*GS.29* (6.10.11), by Graph Atlas G184) and by pair position $-A$, $GS_{n=-A}^{sup}$, (*GS.30* (6.10.12), by Graph Atlas G180) and their models SM :



A: -2.5.8; B: -2.4.5; C: -2.3.2;
D: +2.3.3; E: +2.4.5.

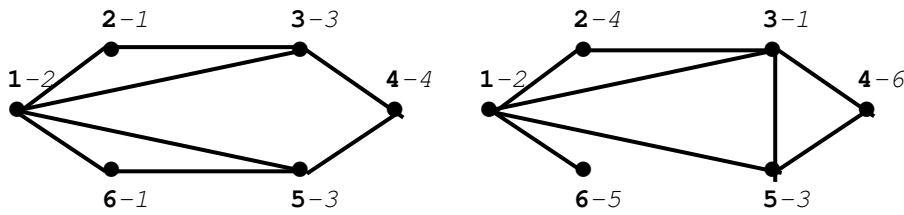
A: -2.4.5; B: -2.3.2;
C: +2.3.3; D: +2.4.6; E: +2.5.8.

						k			
1	2	3	3	4	4				
1	4	3	5	2	6	i	ABCDE	1234	
0	-B	E	E	E	E	1	01004	1 0022	
		0	D	D	-C	4	01220	2 0020	
			0	E	D	-A	3	10022	3 1111
				0	-A	D	5	10022	3 1111
					0	D	2	10121	4 1011
						0	6	10121	4 1011

						k			
1	2	2	3	4	4				
1	3	5	4	2	6	i	ABCDE	1234	
0	E	E	D	C	C	1	00212	1 0212	
		0	D	D	C	-A	3	10121	2 1111
			0	D	-A	C	5	10121	2 1111
				0	-A	-A	4	20030	3 1200
					0	-B	2	21200	4 1100
						0	6	21200	4 1100

Comments: All the *adjacent super-graphs* by pair position $-B$, $G_{n=-B}^{sup}$, are *isomorphic* and all the *adjacent super-graphs* by pair position $-A$, $G_{n=-A}^{sup}$, are also *isomorphic*.

Adjacent sub-structures by pair position $+D$, $GS^{sub}_{n=+D}$, (GS.72 (6.8.18), by Graph Atlas G148) and by pair position $+C$, $GS^{sub}_{n=+C}$, (GS.76 (6.8.22), by Graph Atlas G137) and their matrices S :



A: -2.4.4; B: -2.3.2;
C: +2.3.3; D: +3.4.4.

A: -3.5.6; B: -2.4.5; C: -2.3.2;
D: +1.2.1; E: +2.3.3; F: +2.4.5.

1	2	3	4					k
2	6	1	3	5	4	i	ABCD	1234
0	-B	C	C	-B	-B	2	0320	1 0110
0	C	-B	C	-B	6	0320	1 0110	
0	C	C	-A	1	1040	2	2020	
0	-A	D	3	1121	3	1101		
0	D	5	1121	3	1101			
0	4	1202	4	0020				

1	2	3	4	5	6					k
3	1	5	2	6	4	i	ABCDEF	123456		
0	F	F	E	-C	E	3	001022	1 011101		
0	E	E	D	-B	1	010121	2 101110			
0	-B	-C	E	5	011021	3 110001				
0	-C	-C	2	012020	4 110000					
0	-A	6	103100	5 010000						
0	4	111020	6 101000							

Comment: All the *adjacent sub-graphs* by pair position $+D$, $GS^{sub}_{n=+D}$, are *isomorphic* and all the *adjacent sub-graphs* by pair position $+C$, $GS^{sub}_{n=+C}$, are also *isomorphic*.

Corollary 4.4. Let there exist a isomorphic structures G_A and G_B . Then, in the case of each pair of pair orbits $(\mathcal{OR}_n)_A$ and $(\mathcal{OR}_n)_B$, $n \in [1, N]$, according to Prop. 4.2 exist isomorphic isomorphism classes, $(\Gamma_n)_A \cong (\Gamma_n)_B$, $n \in [1, N]$, of corresponding adjacent graphs $(G^{adj}_n)_A$ and $(G^{adj}_n)_B$, where $(G^{adj}_n)_A \subset (\Gamma_n)_A$ and $(G^{adj}_n)_B \subset (\Gamma_n)_B$.

We already know, that isomorphic graphs $G_A \cong G_B \cong G_C \cong \dots$ have isomorphic adjacent graphs $(G^{adj}_n)_A \cong (G^{adj}_n)_B \cong (G^{adj}_n)_C \cong \dots$. Different adjacent structures G^{adj}_n , $n \in [1, N]$, of a graph G are *non-isomorphic* as a rule.

Proposition 4.4. If the morphisms $F_n: GS \rightarrow GS^{adj}_n$ have been disjunctively applied $F_1 \vee \dots \vee F_n \vee \dots \vee F_N$ to the orbits $\mathcal{OR}_1, \dots, \mathcal{OR}_n, \dots, \mathcal{OR}_N$ of a graph structure GS , then we say that structure GS is *deconstructed (decomposed)* to its adjacent structures $\{GS^{adj}_n\} = GS^{adj}_1, \dots, GS^{adj}_m, \dots, GS^{adj}_N$.

Indivisible structures cannot exist. We already know, that adjacent structure GS^{adj}_n mean an *isomorphism class* Γ^{adj}_n that can be contain isomorphic adjacent graphs $(G^{adj}_n)_1 \cong (G^{adj}_n)_2 \cong (G^{adj}_n)_3 \cong \dots \subseteq GS^{adj}_n = \Gamma^{adj}_n$.

4.4. Reconstruction –an opposite operation of deconstruction (decomposition)

To *reconstruction* of a graph structure GS we take there reconstructability the structure by its adjacent structures GS^{adj}_n .

Proposition 4.5. If structure GS is *deconstructed (decomposed)* to its adjacent *substructures* $GS^{sub}_1, \dots, GS^{sub}_m, \dots, GS^{sub}_N$, i.e. to its greatest substructures $(GS \setminus e_{ij})_n$, then their *union* $\cup (GS \setminus e_{ij})_n$, $n^+ \in [1, N^+]$, *reconstruct (recompose)* the same structure GS .

Comments:

1. Let G is represented in the form of adjacent matrix E . Deconstruction the structure GS to its adjacent substructures mean by Prop. 4.4 strictly disjunctive removal an edge $(E\backslash e_{ij})_1 \vee \dots \vee (E\backslash e_{ij})_n \vee \dots \vee (E\backslash e_{ij})_N$ in the case of each edge or pair(+)orbit \mathcal{OR}_n . This means that in each adjacent matrix E_n be lacking a connection. Consequently their union reconstruct the graph, $(E\backslash e_{ij})_1 \cup \dots \cup (E\backslash e_{ij})_n \cup \dots \cup (E\backslash e_{ij})_N = E, E \equiv G$.
2. Principally be valid (1) also then, when graph is presented by its list L of adjacent vertices $(L\backslash e_{ij})_1 \cup \dots \cup (L\backslash e_{ij})_n \cup \dots \cup (L\backslash e_{ij})_N = L, L \equiv G$.
3. If it is necessary to compare the graphs G_A and G_B , it is the first step to *represent of their canonically*, i.e. in the form of sign matrices S_A and S_B . If they prove be structurally equivalent, $S_A \approx S_B$, then by Prop. 3.2, the graphs are isomorphic $G_A \cong G_B$, and vice versa. It also means the orbits isomorphism, $(\mathcal{OR}_n)_A \cong (\mathcal{OR}_n)_B$. As shown, to elements $(e_n)_A$ and $(e_n)_B$ of an orbit correspond the isomorphic sub-graphs $(G_A \backslash e_n) \cong (G_B \backslash e_n)$ or isomorphic super-graphs $(G_A \cup e_n) \cong (G_B \cup e_n)$ – and vice versa.
4. Isomorphism testing can begin from sub-graphs $(G_A \backslash e_n)$ and $(G_B \backslash e_n)$ or super-graphs $(G_A \cup e_n)$ and $(G_B \cup e_n)$. If they isomorphism classes $(\Gamma^{\text{adj}}_n)_A$ and $(\Gamma^{\text{adj}}_n)_B$ by orbits, $n \in [1, N]$, coincide, they have a common super- or sub-structure GS .
5. If a graph G that belong to isomorphism class Γ is *reconstructable* by its adjacent structures GS^{adj}_n , then are so also all other graphs G_B, G_C, G_D, \dots of isomorphism class Γ .
6. Thus, Ulam's Conjecture is true, but its set up is *destructive* and it verbatim tracking on the ground of semiotic models is *senseless*.

Proposition 4.6. If structure GS is *deconstructed* to its adjacent *superstructures* $GS^{\text{sup}}_1, \dots, GS^{\text{sup}}_m, \dots, GS^{\text{sup}}_N$, i.e. to its smallest superstructures $(GS \cup e_{ij})_n$, then their *intersection* $\cap (GS \cup e_{ij})_n, n^- \in [1, N^-]$, *reconstruct* the same structure GS .

Intersection works in case of adjacent matrix, $\cap (E \cup e_{ij})_n = E, E \equiv G$ and lists $\cap (L \cup e_{ij})_n = L, L \equiv G$

Corollary 4.5. If structure GS is on the ground of its pair orbits $\mathcal{OR}_n, n \in [1, N]$, *deconstructable* to its adjacent structures, $F_n: GS \rightarrow GS^{\text{adj}}_n$, then it is *reconstructable* both by *an union of adjacent substructures* $\cup GS^{\text{sub}}_m, n^+ \in [1, N^+]$, and by *an intersection of adjacent superstructures* $\cap (GS \cup e_{ij})_n, n^- \in [1, N^-]$.

Edge symmetric graph G has only *one* adjacent substructure $GS^{\text{sub}}_{n^+ = 1 = N^+}$. If it is also *bisymmetric*, then it has also *one* adjacent superstructure $GS^{\text{sup}}_{n^- = 1 = N^-}$.

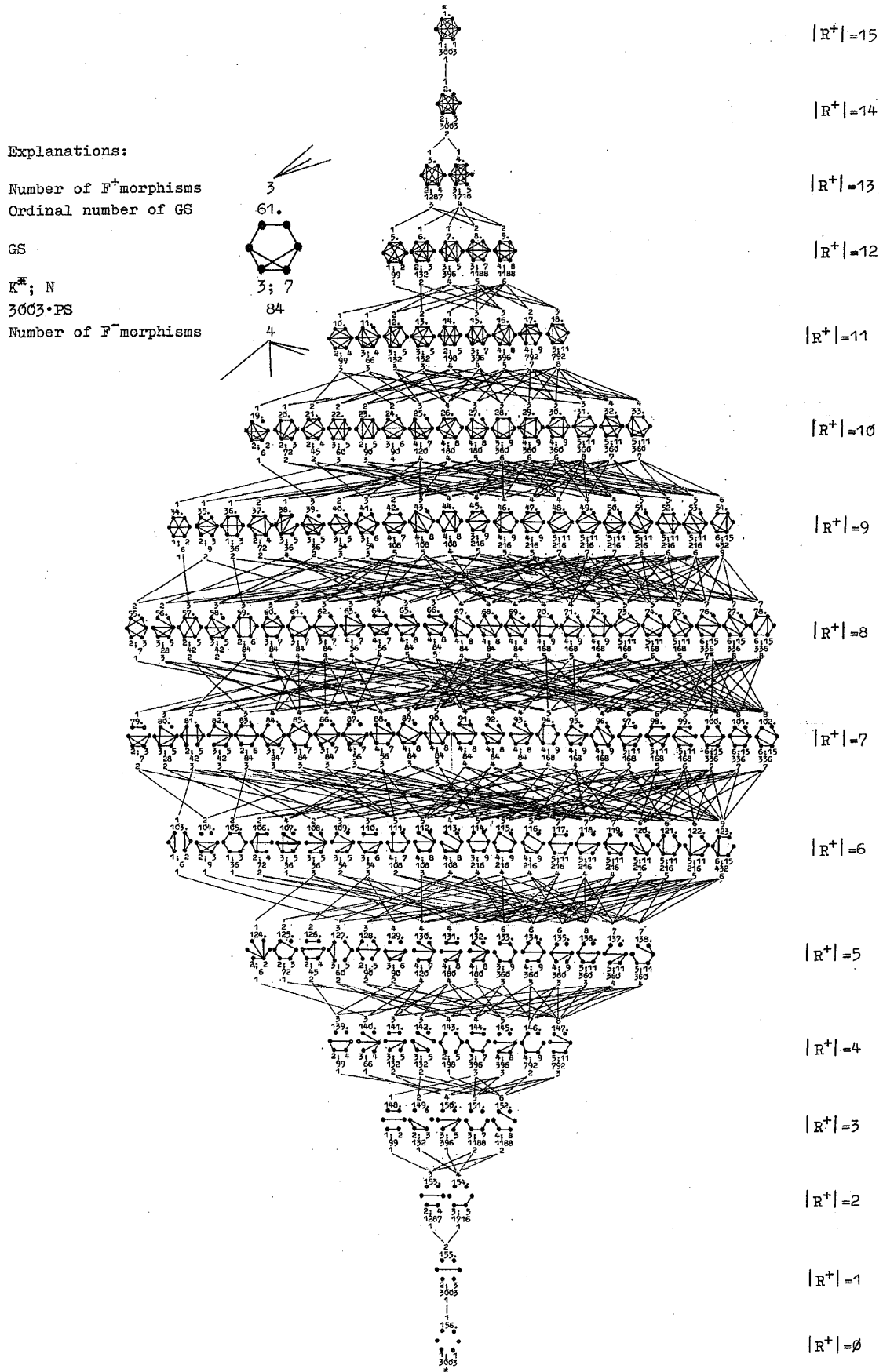
By formulation the Ulam's Conjecture must be speak on two isomorphic graphs G_A and G_B that have p edges and have correspondingly p pairs of isomorphic adjacent graphs $G_A^{\text{sub}}_p \cong G_B^{\text{sub}}_p, p \in [1, P]$.

In principle are all the graph structures GS also adjacent structures GS^{adj}_n of some structures. Trueness, that non-isomorphic graphs cannot have the same common adjacent structures to demonstrate following system of the structures.

Definition 4.2. A system, that is formed from all the *structures with $|V|$ -elements (i.e. non-isomorphic graphs with $|V|$ vertices)* $\{GS\}^{|V|}$ and *morphisms $\{F\}$* between these whereby:

- i the set $\{GS\}^{|V|}$ is decomposed and ordered by numbers of edges $|E|$ into *structural levels GSL* ,
 - ii where structures GS in GSL are ordered by essential structural measures,
- we call to a **Constructive System of Structures** or *structural reconstructions* denoted by $CSR^{|V|}$ where $|V|$ is its *degree* [Tevet 33, 39].

Example 4.4. The lattice of Constructive System of Structures $CSR^{IV=6I}$ with $|V|=6$ elements:



It is possible to set up another kind of reconstruction.

Proposition 4.7. Morphism F is *reversible* – in each adjacent structure GS^{adj} of GS exists an “*opposite orbit*” OR , whereat used opposite morphism F' reconstruct the initial structure GS , $F': GS^{adj} \rightarrow GS$.

The reversing of morphism is valid both in the case of sub- GS^{sub}_{n+} and super-structures GS^{sup}_{n-} . Indeed, structure GS can be reconstructed by each of its adjacent structure GS^{adj} separately. On the set $\{GS^{adj}_n\}$ of all the adjacent of GS there exists certain *set of opposite morphisms* $\{F'_n\}$, $n \in [1, N]$, such that each its disjunctive element $(F'_1: GS^{adj}_1 \rightarrow GS) \vee \dots \vee (F'_N: GS^{adj}_N \rightarrow GS)$ reconstructs the structure GS separately.

The algorithm of forming the system CSR and the complete system $CSR^{|V|=6}$ are presented in S.E.R.R. issues [Tevet 33 and 39]. System $CSR^{|V|=5}$ is presented here as a complementary example.

As is known, and the lattice is made, can he non-isomorphic graphs have a common adjacent structure. On the aspect of decomposition and recomposition is each structure GS , i.e. isomorphism class Γ reconstructable itself. Ulam’s Conjecture formulation does not reflect anything other than the fact it is the same. A pair of isomorphic graphs belongs to the same isomorphism class Γ . In structural terms is not acceptable to the wording of the Ulam’s Conjecture.

Since the adjacent structures are in accordance with Prop. 4.2 directly related to orbits then on structural aspect be expressed the essence of Ulam’s Conjecture in accordance with Coroll. 4.2 in the form of following question: Can be the graphs G_A a G_B which are presented by structurally equivalent semiotic models $SM_A \approx SM_B$ turn out to be non-isomorphic?

Next: A complementary example: Constructive System of Structures with five elements