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The Metamorphosis Formula

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Abstract

This study presents and explores the "Metamorphosis Formula," a theoretical framework designed for analyzing structural and morphological transformations in language, influenced by technological advancements and the demands of modern communication. A central component of the research is the development of algorithmic grammar theory, which utilizes mathematical formulas to analyze linguistic transformations, including changes induced by prefixes, infixes, and suffixes, as well as the use of chromatic algorithms to visually highlight grammatical information through color coding. The research integrates key concepts such as chromatic algorithms, the grammatical map, and the geometric architecture of information expression. It examines grammatical transformations at both national and international levels, focusing on the origin and adaptation of grammatical elements across various languages. The study analyzes the role of parentheses in grammatical structures and the adaptation of word roots in different linguistic contexts. Additionally, it develops advanced formulas, including the tone formula, the comparative formula, and the grammatical time formula, integrating grammatical correlations such as addition, elimination, fusion, and semantic flexion into a mathematical expression framework. The research explores the fusion and conjunction processes in grammatical elements, analyzing relationships such as determinant and determined, theme and rheme, and anaphoric and cataphoric elements. These relationships are mathematically defined and visually represented, offering new insights into linguistic structures. The study also examines information distribution processes within grammatical elements, addressing their morphological, syntactic, and phrasal values, and representing them through visual and mathematical models to enhance clarity. The findings emphasize the utility of color as a tool for facilitating the rapid comprehension of grammatical information, with significant implications for education and natural language processing. By connecting linguistic theory with mathematical and visual methodologies, this research contributes to a deeper understanding of linguistic evolution and offers practical applications for improving communication efficiency in academic and technological contexts.

Keywords

Algorithms, Transformation, Grammar, Colors, Innovation

1. Introduction

At its core lies the concept of algorithmic grammar, which employs mathematical formulas to analyze linguistic transformations, including structural changes driven by prefixes, infixes, and suffixes. A key innovation of this research is the use of chromatic algorithms developed by the author to visually highlight grammatical information, enhancing comprehension and processing.

This theoretical framework, created by the author, combines mathematical algorithms with grammatical rules to illustrate the dynamic evolution of languages. It emphasizes the geometric architecture of grammar and examines how word roots and letters transform to convey grammatical information such as gender, number, and case. By integrating these elements, the study provides a comprehensive understanding of the dynamic and static states of grammatical structures.

One of the study's most innovative aspects is the use of color coding to represent grammatical information. Colors are used to indicate the minimal sets of information necessary to characterize grammatical elements, reflecting their morphological value and semantic structure across various languages. This approach facilitates a deeper understanding of linguistic dynamics and promotes efficient learning and retention of grammatical structures.

The research also introduces a grammatical map, a visual tool developed by the author that organizes grammatical information holistically, enabling a clearer understanding of the structure and dynamics of language. Additionally, it analyzes the role of parentheses in grammatical structures, highlighting their contribution to organizing information and illustrating semantic and morphological changes in grammatical elements.

Through the use of algorithmic formulas and chromatic models, the study offers new perspectives on linguistic evolution. It delves into the formula of grammatical time, which algorithmically transforms grammatical tenses and modes of action, clarifying temporal sequences and action characteristics. This standardized notation, created by the author, facilitates comparative analysis and contributes to a deeper understanding of language across diverse contexts.

The research is structured into three parts:

Chapter 1 introduces the formula for the transformation process, defining each transformation and its application, while emphasizing its interdisciplinary relevance.

Part 2 focuses on grammatical elements, their identification, and adaptability, analyzed from both algorithmic and morphological perspectives.

Chapter 3 details the transformation processes and algorithmic formulas associated with grammatical elements, exploring the fusion of elements as grammati-

cal operations with mathematical analogies. This chapter integrates insights from the previous sections, demonstrating the utility of algorithms in classifying and organizing grammatical data systematically.

The study emphasizes the interdisciplinary implications of the "Metamorphosis Formula," particularly in education, artificial intelligence (AI), and natural language processing. By bridging linguistic theory with mathematical and visual methodologies, it promotes efficient communication and a deeper understanding of linguistic dynamics.

A central theme of the research is its reliance on human creativity, intuition, and ethical judgment, which are essential for developing innovative linguistic theories that AI cannot achieve independently. While AI relies on pre-existing algorithms and models, this study highlights the irreplaceable role of human ingenuity in interpreting results, making informed decisions, and adapting methodologies to new information. The creative process behind the "Metamorphosis Formula" was shaped by interdisciplinary knowledge, personal experience, and contextual understanding, fostering innovation in linguistic research.

The study also underscores the limitations of AI in replicating human attributes such as creativity, adaptability, and ethical reasoning. It advocates for the harmonious integration of human imagination with technological capabilities to unlock the full potential of language research. By combining algorithmic precision with human insight, this approach offers groundbreaking applications in education, natural language processing, and AI.

In conclusion, "The Metamorphosis Formula" represents a novel framework for understanding linguistic evolution, emphasizing the dynamic interplay between human creativity and technological advancements. It highlights the importance of interdisciplinary knowledge, ethical considerations, and contextual understanding in advancing linguistic research, ultimately proposing a future where human ingenuity and AI work together to achieve transformative progress in the field.

2. Methodology

The methodology of this research is structured to explore and analyze in depth the structural and morphological transformations of language through the use of chromatic and grammatical algorithms. The methodological approach includes several stages, detailed below.

2.1. Data Collection

2.1.1. Data Sources

Data was collected from various linguistic sources, including dictionaries, academic papers, specialized articles, and linguistic corpora for the exemplified languages (Ciocioc, 2024).

Both literary and technical texts were used to ensure a variety of grammatical and stylistic contexts (Ciocioc, 2024).

2.1.2. Selection of Exemplars

A representative set of words and phrases from each analyzed language was selected to identify and illustrate grammatical and morphological transformations (Ciocioc, 2024).

2.2. Algorithmic Analysis

2.2.1. Algorithmic Formulas

Algorithmic formulas, developed to model the structural and morphological transformations of words, serve as a cornerstone for analyzing algorithmic grammar and identifying transformation patterns. These formulas adapt word roots to various grammatical contexts, modeling morphological changes induced by prefixes, infixes, and suffixes (Author's original research, Ciocioc, 2024).

2.2.2. Implementation of Algorithms

The algorithms were used to analyze the adaptation of word roots in various grammatical contexts (Author's original research, Ciocioc, 2024).

2.3. Chromatic Representation

Chromatic dictionaries are innovative tools designed to organize grammatical information using colors, where each hue represents a specific meaning. This color-coded system enhances the quick comprehension of grammatical concepts by linking colors to their definitions and significance (Author's original research, Ciocioc, 2024). The research integrated the chromatic dictionary with a grammatical map, creating a visual framework for the information (Author's original research, Ciocioc, 2024).

2.4. Validation and Review of Results

The grammatical transformations of the exemplified languages were compared and contrasted to identify structural similarities and differences (Author's original research, Ciocioc, 2024).

Concrete examples were used to highlight the specific grammatical adaptations and variations of each language (Author's original research, Ciocioc, 2024).

2.5. Comparative Analysis

2.5.1. Internal Validation

The results obtained through the application of algorithmic formulas and the use of the chromatic dictionary were internally reviewed and validated (Ciocioc, 2024).

Adjustments and improvements were made based on the feedback received (Author's original research, Ciocioc, 2024).

2.5.2. External Validation

Feedback was sought from linguistic experts and educators to validate the research approach and results (Ciocioc, 2024).

The feedback obtained was used to improve the proposed methods and algorithms (Ciocioc, 2024).

2.6. Interdisciplinary Applications—Education and Natural Language Processing

The implications of the research for education were explored, demonstrating how the chromatic dictionary and grammatical algorithms can be used to improve language learning and natural language processing (Ciocioc, 2024).

2.7. Documentation and Publication—Drafting Results

All stages of the research were documented, and the results were presented in a clear and systematic manner (Ciocioc, 2024).

3. Results

The study titled "The Metamorphosis Formula" has unveiled a series of groundbreaking insights into the structural and morphological transformations of language, leveraging chromatic and grammatical algorithms. These findings offer a profound understanding of how language adapts and evolves within the framework of digital communication and modern technological advancements.

To support the hypothesis that color coding enhances the comprehension and retention of grammatical structures, the following in-depth research was conducted:

a) Feedback from deaf-mute individuals: Individuals who are deaf and mute tend to excel in processing visual information, relying heavily on their sight to grasp and remember concepts. The implementation of color coding for grammatical information has proven to be particularly advantageous for them. Since they cannot utilize auditory cues for learning, their visual perception becomes a crucial tool for understanding. From their perspective, using a chromatic dictionary to organize grammatical information makes learning more accessible and intuitive. They have noticed that this system helps them grasp grammatical structures more quickly and retain information better over the long term. Additionally, the relationships between different grammatical elements are much clearer, allowing them to associate and apply them correctly with greater ease. The methodology described in the document, which employs colors to indicate grammatical information and algorithms, is an innovation that aids them in navigating and understanding the structures of the language more effectively. This visual approach is extremely beneficial for individuals like them, providing a powerful tool for learning and effective communication. In conclusion, they believe that this methodology represents an important step in language learning and are grateful for the effort invested in its development. They are pleased to see new and effective methods that assist them in their learning process (Author's original research, Ciocioc, 2024).

b) Feedback from non-academic individuals: Individuals who are not from

academic or philological backgrounds find the method of color coding grammatical information to be very useful. It helps them understand and retain grammatical structures more easily, making the learning process more accessible and intuitive. They observe that the chromatic system clarifies the relationships between different grammatical elements, allowing them to associate and apply them correctly with greater ease. The methodology described in the document, which utilizes colors to highlight grammatical information and algorithms, is an innovation that assists them in navigating and understanding the structures of the language more effectively. They believe that this visual approach represents an important step in language learning. (Author's original research, Ciocioc, 2024).

c) Feedback from academic participants: Academics and philologists consider the method of color coding grammatical information to be extremely innovative and useful. Color coding facilitates the understanding and rapid retention of complex grammatical structures, adding a visual and intuitive dimension to the study of language. This approach allows for detailed and precise analysis of the structural and morphological transformations of the language. The methodology described in the document, which utilizes chromatic and grammatical algorithms, represents a significant innovation in the field of linguistics. They believe that this methodology enhances clarity, comprehensibility and facilitates a better understanding of grammatical rules and structures (Author's original research, Ciocioc, 2024). In conclusion, they consider this approach to be an important step in linguistic research and have the potential to bring significant benefits in education and natural language processing.

d) Feedback from visual artists: Visual artists consider the method of color coding grammatical information to be a fascinating and extremely useful innovation. The use of colors to highlight grammatical information adds a visual and intuitive dimension to the study of language. This approach transforms a complex and abstract subject into a coherent and accessible visual system, similar to how artists use colors to convey emotions and states (Author's original research, Ciocioc, 2024).

e) Feedback from mathematicians: By employing algorithmic formulas to model the structural and morphological changes in language, this method enhances the precision and organization of grammatical analysis. It aligns closely with mathematical principles, enabling a clear and systematic representation of linguistic dynamics. The integration of color coding for grammatical information with algorithmic formulas provides a fresh perspective on understanding and retaining grammatical structures. This visual and algorithmic strategy aids in identifying and analyzing grammatical relationships, leading to a deeper comprehension of linguistic evolution. Mathematicians believe that the methodology outlined in the document contributes significantly to the rigor and clarity of grammar studies, equipping researchers with powerful tools for analyzing and modeling linguistic data. This fusion of mathematics and linguistics not only enriches theoretical understanding but also opens new avenues for interdisciplinary applica-

tions in education and natural language processing (Author's original research, Ciocioc, 2024).

f) Feedback from surgeons: The use of algorithmic formulas to model the structural and morphological transformations of language brings a level of rigor and precision comparable to the surgical approach in medicine. Color coding grammatical information facilitates a quick and clear understanding of complex structures, much like how visual techniques and color codes are employed to ensure clarity and safety during surgical procedures. The methodology described in the document, which combines chromatic and grammatical algorithms, reflects a meticulous and organized approach, akin to the careful planning and precise execution of surgical operations (Author's original research, Ciocioc, 2024).

3.1. Structural Transformations of Language

Through the application of the developed algorithms, the following structural transformations of language were observed: there was a simplification and compression of grammatical structures in digital communication, as well as the identification of transformation patterns at the level of prefixes, infixes, and suffixes, which contribute to word formation and the transmission of grammatical information.

3.2. The Role of Colors in Highlighting Grammatical Information

Enhanced Understanding through Visual Aids: Research on chromatic algorithms has demonstrated that utilizing colors to emphasize grammatical information significantly boosts recognition and retention. This approach has been experimental validated, showing that it enhances clarity and comprehensibility of grammatical concepts while also improving the learning and retention of linguistic structures through chromatic coding. Studies indicate that color-based methods in education can greatly influence memory and attention, thus aiding in the retention of information.

3.3. Algorithmic Grammar

The theory of algorithmic grammar developed in this study has enabled:

- the mathematical modeling of grammatical transformations, providing an accurate and systematic representation of the dynamics of language.
- he creation of an algorithmic dictionary that codes linguistic transformations and highlights grammatical relationships.

3.4. Comparative Analysis of Languages

The comparative analysis of Greek, English, and Romanian languages revealed:

- the adaptability of grammatical structures to different cultural and linguistic contexts.
- the identification of commonalities and specific differences of each language, contributing to a better understanding of linguistic diversity.

3.5. Interdisciplinary Applicability

The research results have demonstrated significant applications in various fields:

- education: The developed methodologies can be used to improve the language learning process and facilitate the teaching of grammar.
- artificial Intelligence: The algorithms and models developed can be integrated into natural language processing technologies, enhancing their accuracy and efficiency.
- computational Linguistics: The research provides a theoretical and practical framework for the analysis and development of new linguistic tools and technologies.

4. Discussions

This section analyzes and interprets the results obtained in the study "The Metamorphosis Formula," providing a perspective on the significance and implications of the findings. It also explores possible limitations of the study and proposes directions for future research.

4.1. Interpretation of Structural Transformations of Language

The analysis of structural transformations of language revealed that technological advancements and means of instant communication have led to the simplification and compression of grammatical structures. This phenomenon was observed in the way prefixes, infixes, and suffixes were assigned specific roles in word formation and the transmission of grammatical information. This aligns with foundational theories on the structure of language, which emphasize the adaptability of grammar to changing contexts (Chomsky, 1965).

Implication: These findings highlight the necessity of adapting educational methodologies to reflect the new linguistic realities and facilitate the process of learning grammar in the digital era.

4.2. Efficiency of Colors in Highlighting Grammatical Information

Testing the use of colors to highlight grammatical information has demonstrated that this method improves the clarity and comprehensibility of linguistic structures. The use of a chromatic dictionary facilitated the rapid recognition and retention of grammatical information. This approach is supported by work on visual information design, which emphasizes the role of color in enhancing comprehension (Tufte, 1990).

Implication: Methodologies based on the use of colors could be integrated into the educational curriculum to improve language learning and processing. Additionally, software applications could be developed to utilize this technique for linguistic education.

4.3. Relevance of Algorithmic Grammar

Algorithmic Grammar and Structural Transformations: Research has shown that

the theory of algorithmic grammar facilitates the mathematical modeling of grammatical transformations, providing a precise and systematic representation of language dynamics. The development of an algorithmic dictionary that encodes these linguistic transformations has clarified grammatical relationships and enhanced the analysis of linguistic structures. Additionally, the study introduced and applied algorithmic formulas to model the structural transformations of words, resulting in an accurate depiction of grammatical dynamics.

Implication: These algorithmic approaches can be utilized in the advancement of natural language processing and artificial intelligence technologies, significantly contributing to the enhancement of machine translation systems and voice recognition.

4.4. Adaptations of National and International Grammars

The comparative analysis of the Greek, English, and Romanian languages has highlighted the diversity and variability of grammatical structures in different linguistic and cultural contexts. The results have demonstrated the adaptability of languages to technological and social developments. This is consistent with work on the relationship between language and culture, which underscores the influence of societal changes on linguistic evolution (Sapir, 1921).

Implication: Future research could explore other languages to identify common patterns and specific variations, contributing to a better understanding of linguistic diversity and the mechanisms of grammatical adaptation.

4.5. Interdisciplinary Applications and Study Limitations

The research findings indicate that the developed methodology is applicable across various domains, including education, natural language processing, and artificial intelligence. However, the study faced certain limitations, such as:

Data sample: The size and diversity of the data sample may affect the ability to generalize the results.

Algorithmic complexity: The implementation of the mathematical algorithms demands considerable computational resources, which could pose challenges in practical applications.

Additionally, the study underscored the method's interdisciplinary relevance. The incorporation of color coding not only enhanced linguistic understanding but also proved beneficial in fields like natural language processing and educational technology. For example, in education, color coding facilitated students' comprehension of complex grammatical structures. In the realm of natural language processing, the developed algorithms and chromatic models have the potential to improve the accuracy and efficiency of AI-driven language processing tools (Jurafsky & Martin, 2023).

4.6. Future Research Directions

Building on the results and findings obtained, future research directions may in-

clude extending the applicability of "The Metamorphosis Formula" to other languages and linguistic contexts. Exploring the applicability of chromatic algorithms in interdisciplinary fields such as machine translation and text analysis can open new opportunities for innovation. Additionally, the development of educational applications and language processing technologies based on these algorithms can bring significant benefits to education and communication.

5. Conclusion

In my research "The Metamorphosis Formula," I explored the structural and morphological transformations of language by integrating chromatic and grammatical algorithms. The results obtained demonstrate that the use of these algorithms can efficiently and systematically model the dynamics of language, highlighting both the simplifications and structural complexities resulting from technological advances and means of instant communication.

5.1. Contributions and Key Findings

5.1.1. Innovation of Colors in Highlighting Grammar

I demonstrated that the use of colors to highlight grammatical information improves clarity and understanding, facilitating the process of learning and retention of linguistic structures.

5.1.2. Theory of Algorithmic Grammar

I developed and applied algorithmic formulas that allow for the mathematical modeling of grammatical transformations, providing an accurate and systematic representation of the dynamics of language.

5.1.3. Comparative Analysis of Languages

I conducted a comparative analysis of Greek, English, and Romanian languages, highlighting the diversity and variability of grammatical structures in different linguistic and cultural contexts.

5.2. Implications and Applications

The research brings valuable contributions to the field of education and artificial intelligence. The developed methodologies can be used to improve the language learning process, providing new educational tools based on the chromatic and algorithmic representation of grammatical information. Additionally, the developed algorithms can be integrated into natural language processing technologies, improving machine translation and voice recognition systems.

5.3. Limitations and Future Research

The study also presents some limitations, such as the size and variability of the data sample, as well as the complexity of implementing mathematical algorithms. Future research directions may include extending the applicability of "The Metamorphosis Formula" to other languages and linguistic contexts, as well as explor-

ing the applicability of chromatic algorithms in interdisciplinary fields.

5.4. Final Conclusion

"The Metamorphosis Formula" represents an innovative and systematic approach to analyzing and modeling language. The integration of chromatic and grammatical algorithms provides a new perspective on grammatical dynamics, promoting a deeper understanding of linguistic evolution and improving communication efficiency. The research results open new opportunities for the development of educational methods and advanced language processing technologies.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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Appendix

1. Tables of Formulas for Transformation Processes

Table 1.a) : Formulas for Transformation Processes / The color algorithm of grammatical information.

1)

1) The processes of transformation

C/c = ~{~/+[±/+/-/~(~/>/</±/+/-/=/≠/R/≠/=/+/-/0//+/>/</~)'~/-/+/±/~/=]/~}

1')

Through the use of colors, the aim is not only to attract attention but also to organize information in a way that allows for easier and quicker interpretation of the formulas. This visual approach is essential in the educational context, as it helps consolidate knowledge and develop students' analytical skills. Thus, the material not only enriches theoretical knowledge but also facilitates its practical application in various fields of science.

~[~,±,+,+/-,-,~ (~,±,+,+/-,-,R)-,-/+,+, ±,~]~ | [±,+,+/-,-,~ (>,~,±,+,+/-,-,>R0<)-,-/+,+, ±,~]~ | [±,+,+/-,-, (±,+,+/-,-/R)-,-/+,+, ±] | [±,+,+/-,-, (±,+,+/-,-,R)-,-/+,+, ±] | [±,+,+/-,- (±,+,+/-,-,/R,0)-,-/+,+,±]

	prefix / prefix / πρόθεμα A'	Infix / infix / εισόθημα B'	sufix / suffix / επιθημα C'	
A) C[n(nR0)n]	C[n(R)] → C[(R0+)]	C[(nR)] → C[(R0+)]	C=[(R)n] → C=[(R)n]	
B) C[n(nR0)n]	C[n(R)]	C[(nR)]	C=[(R)n] → C=[(R)n]	
			C=[(R)n]	Exprimare generala terminatie / tema c[n(nR0)n]
C) C[nn(nnR0)nn]	C=[nn(R)] → C[n(R)]	C[(nnR)] → C[(nR)]	C=[(R)nn] → C=[(R)n]	
		C[(nnR)] → C[(nR)]		
		C[(nnR)] → C[(nR)]		
D)	C[(nR)]	C[(nR)]	C[(R)n]	
1') C[n(nR0)n] / 2') C[nn(nnR0)nn]	C[nn(R)]	C[(nnR)] / C[(nnR)]	C=[(R)nn]	
	C[nn(R)]	C[n(nnR)] / C[n(nnR)]	C=[(R)nn]	
		C[n(nnnR)]		
E) C[nnnnn(nnnnnR)nnnn]	C=[nnn(R)] → C=[nn(R)]	C[(nnnR)] → C[(nnR)]	C=[(R)nnn] → C=[(R)nn]	
		C[(nnnnR)] → C[(nnR)]		
		C=[(nnnR)] → C[(nnR)]		
		C=[(nnnR)] → C[(nnR)]		
		C=[(nnnR)] → C[(nnnR)]		
		C=[(nnnR)] → C[(nnnR)]		
		C[(nnnnR)] → C[(nnnR)]		
		C[(nnnnnR)] → C[(nnR)]		
		C[(nnnnR)] → C[(nnnR)]		
		C[(nnnnR)] → C[(nnnR)]		
		C[(nnnnR)] → C[(nnnR)]		
		C[(nnnnnR)] → C[(nnR)]		

Table 1.b) : Formulas for Transformation Processes / The indication of the transformation process - Information transfer Information substitution

1)			
2') →	A) the indication of the transformation process (Rn) → (Rn)	A') indicating the inner meaning of the grammatical element in the semantic transformation process	- inside [(R≠)] → [(R≠)]
			- outer [(R)≠] → [(Rn)≠]
		B') the indication of the process of transformation	- simple 1
			- complex 1+
	B) (a → n) information transfer	c[+(+R0)+] → c[(R0)]	A') loss of information - through the addition of grammatical components c(a) → c(b)
			B') information removal - removal of grammatical components c(a) → c(b)
	C) information substitution (N → N)		

Table 1.c): Formulas for Transformation Processes / Addition

1)				
3') + addition	A) [n (n R) n] addition of grammatical components	a) n+n = C		
		b) c[n (R0)] "n" (prefix)	a') c[n(R)] with grammatical information 'n' suffix	a)' c[+(R)] without grammatical information
				b)' c[+(R0)] without / with minimal grammatical information
			b') c[+(R0)] grammatical information for characterizing meaning	
		c) c[(n R0)] "n" (infix / ενθέμα)	a') c[(+/+R0)] without grammatical information / with grammatical information	
			b') c[(+R)] without grammatical information	
		d) c[(R0) n] → c[(R0)+] with grammatical information 'n' suffix		
	B) [-(-Rn)-] + [-(-Rn)-] fusion by addition	a') C[(Rn)] + C/[(Rn)]	C[(R)+] + C[(R)+] => C/[(R)+]	
		b') C[(Rn)-] + C/[-(Rn)]	a)' C[+(R)+] + C[(R)+] => C/[+(R)+]	
			b)' C[(R0+)] + C[(R)+] => C/[(R)+]	
		c') c'[(Rn)] + c[-('Rn)]	c'[(R0)] + c[('R0+)] => c'[('R0+)]	
		d') c'[(Rn)-] + c[('Rn)]	c'[(R0)] + c[('R0)+] => c'[('R0)+]	

Table 1.d) : Formulas for Transformation Processes / Introduction - Decomposition - Informational division

1)			
4') ><	A) >(>< introduction / semantic identification of components	a) semantic introduction	a') C[+(>R)] introduction of letters (affixes - prefixes) / contain characteristics or not
			b') C[(+>R)] introduction of letters (affixes - infixes) / contain characteristics or not
			c') C[(R<)+] introduction of letters (affixes - endings - suffixes) / contain characteristics or not
		b) semantic introduction	a') C[+(<R)]
			b') C[(+<R)]
			c') C[(R>)+]
	B) [<0(> R<)0>] decomposition	a) C[(R<)+0>+] suffix	b) C[(R)<+0>+] suffix
	C) informational division C[<0>[<0>R<0>]<0>]		

Table 1.e): Formulas for Transformation Processes / Replacement

1)				
5') -/+ Replacement	A) [-/+ (R)]	B) [(-/+ R)]	C) [(R-/+)]	D) [(R)-/+]

Table 1.f): Formulas for Transformation Processes / semantic conjunction

1)			
6') Rn / Rn semantic conjunction	A) c[(Rn)] / C[(Rn)]	B) c/C[(Rn)] / C[(Rn)]	C) c[(Rn)] / C[(Rn)]

Table 1.g) : Formulas for Transformation Processes / Merger of formulas - Fusion of meaning and formulas of grammatical elements

1)

7') >/< (Rn) >/< (Rn)

A) merger of formulas

a) Σc/C >/< Σc/C => Σ(e)C[(Rn)]

a')	c'[(R)+] >/< C[(R)+] => C'/[(R)+]
b')	c[('R0)+] >/< C[(R)+] => C[('/R)+]
c') / a')	c[('R+)] >/ C[(R)+] /< C[(R)+] => C[(R)+] / C[('R)+]
c') / b')	c'[(R0)] >/ C[(R)+] /< C[(R)+] => C[(R)+] / C'/[(R)+]
d') / a')	C[(R)+] / c'{[(R+)]} >/< C[(R0+)] => C[(R)+] / C'{[(R0+)]}
d') / b')	C[(R)+] / c[('R+)] >/< C[(R)+] => C[(R)+] / C[('/R)+]

B) fusion of meaning and formulas of grammatical elements

b) Σc/C >/< Σc/C => Σ(e)«C[(Rn)]» nφ — c[('R)+] >/< C[(R0+)] => «C[('R0+)]» oφ

c) / a') => Σ(e)«C[(Rn)]» nφ — c'[(R0+)] >/< c[('R)+] >/< C[(R0+)] >/< => «C'[('R0+)] » πφ

c) / b') => Σ(e)«C/C[(Rn)]» nφ — c'[(R0+)] >/< c[('R)+] > C[(R0+)] /< C[(R)+] >/< => «C[(R0+)] / C[(R)+] » πφ >/<

c) / c') => Σ(e)«c/C[(Rn)]» nφ — c'[(R0)] / C[(R)+] / C[(R0)] >/< => «c'[(R0)] / C[(R)+] / c'{[(R0)]} » εφ >/<

d) Σc/C >/< Σc/C => Nη

e) Ση >/< Ση => ΣF

Table 1.h) : Formulas for Transformation Processes / Semantic elimination

1)

8') semantic elimination - [- (- R) -]

A) c[+(R/0)] fusion by elimination nnnnn → - "n"

a) C [+(R)+] - c[+(R)] "n" => C[(R)+] (nnnnnn / nnnnn)

C[+(R)+] - c[+(R)] "n" → C[(R)+] + c[+(R)] → C[(+>R)+] => C[(R)+] (nnnnnn → nnnnn → nnnnnn nnnnnn)

b)

a')	C [(R)+] / C[+(+R)] - "n"	=>	C[(R)+] / 'C[+(R)] 'nnnnn
b')	C[+(R)+] / C[+(R)+] - "n"	=>	C [+(R)+] / 'C[(R)+] ' nnnnn
c')	C[(R0+)] / C[+(R)] - "n"	=>	C[(R0+)] / 'C[+(R)] ' nnnnn
d')	c[('R0+)] >< C[+(+R)] - "n"	=>	C[+('R)] nn ' nnnnn

B) c[(+R/0)] from within the word / infixal nnnnn → - "n"

a)

a')	C[(+R0+)] nnnnnn	- c[(+R)] - "n"	= C[(+R0+)] nnnnn

b)

b')	C[(+R)+] nnnnnn	- c[(+R0)] "n"	= C[(R)+] nnnnn

c)

c')	[(+R)+] nnnnn	- c[(+R0)] "n"	= C[(R)+] nnnnn

d) /e)

d') /e')	C[(+R)+] nnnnn/nnnn	- c[(+R/0)] "n"	= C[(R)+] nnnnn

C) c[(R/0)+] - from the end of a word considering the next word / suffixal nnnnn → - "n" fusion by elimination

a)

a')	c'[(R0)+]	>< C[(R0+)]	=> C'[(R0+)]
b')	C[(R0+)+]	/ c'[(R0)]	=> C[(R0+)] '/ c'[(R0)]
c')	c'[(R0)+]	>< C[(+R)]	=> C'[(+R)]
d')	c[('R0+)+]	>< C[(R)+]	=> C[('R)+]
e')	C[+(R)+]	/ C[(R)+]	=> C[(R+)] '/ C[(R)+]
f')	c[('R0)+]	>< C[(R)+]	=> C[('R)+]
g')	C[(R)+]	/ C[(R0+)]	=> C[(R0+)] '/ C[(R0+)]
h')	c'[(R0)+]	/ C[(R)+] / c'{[(R0)]	=> « c'[(R0)] '/ C[(R)+] / c'{[(R0)] » εφ
i')	c'{[(R0)+]}	>< c[('R0)+] >/< C[(R0+)]	=> C '{[('/R0+)]}

b)

a')	c'[(R0)+]	>< c[('R0)+]	=> c'[('R0)+]
b')	C[(R0+)+]	/ c'[('R0)+]	=> C[(R0+)] / c'[('R0)+]
c')	C[+(R)+]	/ C[+(R)+]	=> C[(R+)] '/ [+(R)+]
d')	C[(R)+]	/ C[+(R)+]	=> C[(R)] '/ C[+(R+)]
e')	c[('R0)+]	>< C[(R)+]	=> C[('R)+]

C') - from the end of a word, not considering the next word / suffixal

a')	c'{[(R0)]}	>< C[(R0+)+]	/ C[(R)+]	=> C'{[(R+)']}	/ C[(R)+]
b')	C[+(R)+]	>< c'[+(R0)]	/ C[(R0+)]	=> C['(R+)]'	/ C[(R0+)]

Table 1.i) : Formulas for Transformation Processes / The inflection of a grammatical element

9') The inflection of a grammatical element “ ~ “	A) C/c = [= (= ≠R/0 =) =] = semantic switching at the morphological level	B) / a) = [= (= ≠ Σ/S =)=] = semantic switching at the syntactic level	B) / b) = [= (= ≠ Σ/S =)=] = semantic switching at the syntactic level / example
	A') C/c = [= (= ≠R/0 =) =] = semantic metathesis at the morphological level	B') / a) = [= (= ≠ Σ/S =)=] = semantic metathesis at the syntactic level	B) / b) = [= (= ≠ Σ/S =)=] = semantic metathesis at the syntactic level / example
	C) Nη ~ Nη propositional metathesis		
	D) N/n ~ N/n translation into another language		

Table 1.j): Formulas for Transformation Processes / Flexibility

10') ± flexibility	A) C [± (±R)±] semantic flexibility	a) C [±(R)]	b) C[(±R)]	c) C [(R)±]

Table 1.k) : Formulas for Transformation Processes / Comparasion

11) Comparison

11') / A) C[(R)] > [(R)] change of grammatical value	a) - the same formula] = [(=)	b) - different formulas] ≠ [(≠)	
			a') c'{[(R0)]} > C[(R0+)]
			b') C[(R0+)] > C[(R)+]
			c') c'[(R0)] > C[(R)+]
			d') c'{[(R0)]} > c[+(R0)]
			e') C[+(R)+] > c[('R0)+]
			f') c[('R0+)] > C[(R0+)]

11') / B) (R=/≠) - same formula			
a) Σe”(si) (R) = (R) / (=)	a')	a'') Σe(si) (R=/≠/=)=(R=/≠/=) =(=)=	
		b'') Σe(si) (R=/≠/=)=(R=/≠/=) ≠(=)≠	
	b')	Σe(si) (R=/=/≠) = (R=/=/≠) =(=)=	
b) Σe”(se) (R) = (R) / (=)	a')	Σe(si) (R≠/≠/≠)=(R≠/≠/≠) ≠(=)≠	
	b')	a'') Σe(si) (R≠/=/=)=(R≠/=/=) = (=)=	
		b'') Σe(si) (R≠/=/=)=(R≠/=/=) ≠ (=) ≠	

Table 1.l) : Formulas for Transformation Processes / Comparasion - examples

11') C) Σn(n) [(R(n)n] n [(R(n)n] n{n[n(n(n) n]n)n}n - examples	(n) national	A') Σe (1/1)	a)	1)'	Σe(1cn/1C-cn)	[(R=) ≠ [(R=)] =[=(≠) =]=
			b)		Σe(1cn/1Cn)	[(R≠)] ≠ [(R≠)] =[=(≠) =]=
		B') Σe (2/2)		2)'	Σe(2Cn/2Cn)	[(R=)] ≠ [(R=)] =[=[=(≠) =]=]=
		C') Σe (1/2)		3)'	Σe(1Cn/2Cn)	[(R=)] ≠ [(R=)] ≠{≠[=(=) =]≠}≠
	(i) international	D') Σe (1/1)	a)	4)'	Σe(1ci/1ci)	[(R=)=] = [(R=)=] =[=(=) =]=
			b)	5)'	Σe(1ci/1ci)	[(R=)≠] ≠ [(R=)≠] =[≠(=) ≠]=
			c) a') / b')	6)'	Σe(1ci/1Ci)	[(R ≠)=] ≠ [(R ≠)=] =[= (≠) =]=
			d)	7')'	Σe(1ci/1C)	[(R ≠)≠] ≠ [(R ≠)≠] =[≠(=)≠]=
		E') Σe 2/2-3-1	a)	8)'	Σe(2Ci/2C)	[(R=)≠] ≠ [(R=)≠] ={=[≠(=)≠]=}=
			b)	9)'	Σe(2Ci/2C)	[(R=)=] = [(R=)=] ={=[=(=)=]=}=
			c) a') / b') / c')	10)'	Σe(2Ci/C3/-1)	[(R=)≠] ≠ [(R=)≠] ≠{≠[≠(≠)≠]≠}≠
			d)	11)'	Σe(2Ci/2Ci)	[(R=)≠] ≠ [(R=)≠] ≠{=[≠ (=) ≠] =}≠

Table 1.m): Formulas for Transformation Processes / Different types of expressions of the transformation process

1)			
12') Different types of expressions of the transformation process			
A) - the expression of the grammatical meaning of the information		a) Σc = (si)	b) Σc = (se)
B) (RN) = (Rn=n) - types of informational expression	d<>c =e=	a) ≠ [(dsi)] ≠ 1 dsi.< 1+n +...n - informational semantic expansion	a') ≠ [(n)] ≠ 1 dsi.< 1+n +...n
		b) ≠ [(csi)] ≠ 1+n +... n >csi 1 - informational semantic contraction	b') ≠ [(n)] ≠ 1+n +... n >csi. 1
		c) = esi = - informational semantic equality	
	B') N <> N subject	a') ≠ [≠(n)≠] ≠	1 csi 1+n +...
		b') ≠ [≠(n)≠] ≠	1 dis < 1+n +...
		c') = [≠(n)≠] =	1 = esi = 1 +...
		d') = [=(≠)=] =	1 svg1

Table 1.n) : Formulas for Transformation Processes / The process of transformation through national-international connection

1)			
13') / i) / (n-i")			
Rx= {[n(x+x+...)]} = 1Cn - the process of transformation through national-international connection	(Rx)n - the grammatical element originates in the respective language expressed = national grammatical element	[(Rx)]i - the grammatical element has an internatio nal origin = international grammatical element	R(dd) C[(R)] - the root of the grammatical element that is semantically dependent on meaning
A) c[+ (+R/+/0)+] c(dd) - dependent on meaning			
A') c(ddn) c[+ (+R/+/0)+] - national	(ddn) c[+ (+R/+/0)+] → (dd)i c[+(+R/+/0)+]		A") (ddn)i c[+(+ R/+/0)+] - internationally used national
B) C[+(+ R/0/+)+] b(ii) - basic grammatical element (independent semantics, independent of meaning)			
B') b(ii) C[+(+ R/0/+)+] - national	(iin) C[+(+R/0/+)+] → (ii)i C[+(+R/0/+)+]		B") (in)i C[+(+R/0/+)+] - internationally used national
C) c(di)) c'/"{'/"[+'(+'/"R/0/+)+] - grammatical element (semantically independent , meaning-dependent)			
C') c(din)) c'/"{'/"[+'(+'/"R/0/+)+] - independent semantic grammatical element, dependent on meaning, national	c(din) c'/"{'/"[+'(+'/"R/0/+)+] → c(di)i c'/"{'/"[+'(+'/"R/0/+)+]		C") c[(din)i] c'/"{'/"[+'(+'/"R/0/+)'+] - internationally used national
D) c(sd) C/c[+(+ R-/0)+] - semi-independent grammatical element			
B') b(iin) C[+(+R/0/+)+] → D') c(sdn) C/c[+(+ R-/0) +]	B') b(iin) C[+(+R/0/+)+] → D') c[(sd)i] C/c[+(+ R-/0)+]		B") b(iin) C[+(+R/0/+)+] → D") c[(sdn)i] C/c[+(+ R-/0)+] - internationally used national

Table 1.o) : Formulas for Transformation Processes / The component of a word

1)			
13') / II) Rx= {[n(x+x+...)]} = nCn - the component of a word	a) Rx= {[(3x)]} = > 1C3 - 1 word made up of 3 grammatical elements	a') c[(R+)] + c[(R+)] + c[(R+)]	=> 1C3 [(R0+)]
		b') c[+(R0)] + c[(+R0)] + C[([R-/0])+]	=> 1C[3(R)+]
			=> 1C3[(R)+]
		c') c[+(R0)] + C[(+R-/0)] + c[(R0)+]	=> 1C3[(R)+]
		d') c[+(R0)] + C[(+R-/0)] + C[([R-/0])+]	=> 1C3[(R)+]
		c[+(R0)] + C[(+R-/0)] + c[([R-/0])+]	=> 1C3 [(R)+]
	b) Rx= {[(4x)]} = > 1C4 - 1 word made up of 4 grammatical elements	c[+(R0)] + c[(+R-/0)] + C[([R-/0])+] + c[([R-/0])+]	=> 1C4[(R)+]
	c) Rx= {[(5x)]} = > 1C5 - 1 word made up of 5 grammatical elements	c[(R+)] + c[(R+)] + c[(R+)] + c[(R+)] + c[(R+)]	=> 1C5[(R0+)]
		c[+(R0)] +c[(+R-/0)] +c[(+R0)] +c[(+R0)] + c[(R-/0)+]	=> 1C5[(R)+]
	d) Rx= {[(6x)]} = > 1C6 - 1 word made up of 6 grammatical elements	c[+(R0)] + c[(+R-/0)] + c[(+R0)] + C[(+ R-/0)] + c[(+R0)] + c[(+R0)] +c[(R-/0)+]	=> 1C6[(R)+]

Table 1.p) : Formulas for Transformation Processes / The formula of accent / tone

1)
14') The formula of accent / tone
n < n { n [n (σn = n / n / n / n) '/" n] '/" } n > n

Table 1.q) : Formulas for Transformation Processes / Grammatical agreement / disagreement

1)							
15')	(N/n) / (N/n) / .... / Σe"(n/n<=/≠>) - grammatical agreement / disagreement						
Σe" (n/n<=/≠>) - grammatical agreement	A) = at the morphological level	A') Σe" (2/n<=/≠>)	a) Σe"(2/0<≠>)	a') c'[(R0)] (2/0<≠>) C[(R0+)]	b') C[(R)+] (2/0<≠>) C[(R0+)]		
			b) Σe"(2/1<=>)	c[('R0)+] (2/1<=>) C[(R0+)]			
			c) Σe"(2/2<=>)	a') c[('R0)+] (2/2<=>) C[(R)+]	b') c['(R0)+] (2/1<=>) C[+(R)+]		
			d) Σe"(2/2<=>)	Σe"(2/2<=>) → (2/0<≠>)	Σe"(2/1<=>) → (2/1<=>)	Σe"(2/2<=>) → (2/2<=>)	
			e) Σe" (2/±<≠/=>)				
		B') Σe" (n/n<=/≠>)	Σe"(3/1<=>) / (2/3<=>)				
	B) = at the syntactic level	a) N / N (2/n <=>)	a') SB / VB Σe" (2/1<=>)	b') SBd / VB Σe" (2/1 <=>)	c') SBm / VB Σe" (2/1 <=>)	d') SBm / VB Σe" (2/2 <=>)	
		a)' / a') - b') Σφσ (N><N) = Nη					
		b) N / N / N (3/n<=>)	SB / VB / PN Σe"(3/1<=>) / (2/3<=>)				
		c) N / N / N (3/n<≠/=>)	a') SB / VB / ΕΠ Σe" (3/0<=>) / Σe" (2/0<=>)	b') SB / VB / Ατκ/ά-έ Σe"(3/1<≠>) / Σe"(3/0<≠>)	c') VB / SB / ΟΠτ Σe"(3/1<≠>) / Σe"(2/2<≠>)		
		d) N / N / N / ..... (n/n<≠/=>)	a') SB / VB / (ΟΠθ / Ατκ/ά) Σe"(4/1<≠>) / Σe"(4/0<≠>)	b') SB / VB / (Ατκ/ά / ΤΠ) Σe"(4/1<≠>) / Σe"(4/0<≠>)			
Σe" (n/n<=/≠>) = binding agreement		Σe" (n/n<=/≠>) = optional agreement / disagreement					

Table 1.r) : Formulas for Transformation Processes / Total change of a grammatical element

1)	
16')	C[(-R/+R)] - total change of a grammatical element

2. Tables of Formulas for Grammatical Elements

Table 2.a): Formulas for Grammatical Elements / Grammatical components(semantically and meaning dependent)

2) — **Algorithmic formulas of grammatical elements**

I.
c{[(Rn)]} / (cdd)
c[+(+R/+/0'/")+]

- grammatical components (semantically and meaning dependent)

A) c[+(+R+)+] - letters / syllables → C[(R/0)] root

B) c[+(R)] / c[+(R0)]
- affixes = prefix (whether they come from prepositions or conjunctions)

- **a)** C[+(<R)] - existing / identified
- **b)** C[-/+(R)] - replaced
- **c)** c [+(R)] - added
- **d)** (a > b) - change of grammatical value

C) c[(+R)] / c[(+R0)]
- affixes = infixes (they are inserted into the root of a declinable / conjugable grammatical element)

- **a)** C[(+<R)] - existing / identified
- **b)** C[(-/+R)] - replaced
- **c)** C[(+R)] - added

D) c[(R)+] / c[(R0)+]
affixes = suffixes

1)
- the endings of declinable grammatical elements (- unarticulated enclitics)

- **a)** C[(R>)+) - existing / identified
- **b)** C[(R)-/+] - replaced
- **c)** C[(R)+] - added — **c')** C[+(R)+]
- **d)** C[(R)+0+] - derivatives

A') endings
- contain minimal information for characterizing a grammatical element

2)
- the endings of conjugable grammatical elements / the theme

- **a)** C[(R>)+] - existing / identified
- **b)** C[(R)-/+] - replaced
- **c)** C[(R)+] - added
- **d)** C[(R)+0+] - derivatives

D) / B')
[(R0'/")\'+]
affixes = suffixes enclitic article

Table 2.b): Formulas for Grammatical Elements / Detectable root of grammatical elements

2)

II. C/c[+(+R)+]
Detectable root of grammatical elements (contain semantically detectable grammatical information)

A)
C[n(Rn)n]
b(ii) / C[+(+ R)+]
Basic grammatical elements (semantically and meaningfully independent)

- identification

- **a)** C[+(R)]
- **b)** C[(+R)]
- **c)** C[(R)+]

B)
c[n(Rn)n]
c(di) / c[+(+/'/" R0/+)+]
Grammatical components made up of more than one letter (declinable, conjugable, countable / commutable).

c[+('/"R0)+]
- proclitic

- **a)** c[+('R0)] - definite article
- **b)** c[+('R0)] - auxiliary verb
- **c)** c[(+'R0)+] - auxiliary verb
- **d)** c[('R0)+] - auxiliary verb
- **e)** c[('R0)+] - definite article
- **f)** c[('R0)+] - demonstrative article
- **g)** c[('R0)+] - definite article
- **h)** c[(''R0)+] - indefinite article
- **i)** c['(R0)+] - possessive article

b') individual example

Table 2.c): Formulas for Grammatical Elements / Undetectable grammatical elements of root

2)

III
Undetectable grammatical elements of root

A)
From multiple letters

A')
identified

a) C[(R0+)] b) C[(R0+)+] c) C[+(R)+] d) C[(R0+!)] e) c[(R+)] + c[(R+)]

1')
C[n(Rn)n]
b(ii) / C[+(R0+)+]
C[+(R0+)+] / C[(R0+)]
- basic grammatical elements

C[+(R)+]
- represents common characteristics

B')
- semantic and comprehensible independent grammatical elements

a)
a ≠ b

a')
a ≠ b
si
- from the perspective of inner meaning (number, gender, case, person).
Σc [(R≠)] = [(R≠)] = (=) =

b')
a ≠ b
se
- from the perspective of external meaning (the change of grammatical value).
Σc [(R≠)] = [(R≠)] = (≠) =

b)
{[(R0+)]} ≠ [(Rn)]
a ≠ b
a ≠ b
se
- from the perspective of inner / outer meaning.
Σc (R≠)=] ≠ [(R≠)=] = (≠) =

2')
Components
c (di)
- semantic independent grammatical elements, dependent on meaning. (prepositions / conjunctions)

A')
[(R0+)] → c'[(R0)]
c(di)
preposition

a)
[(R0+)] →
simple / identified

a') => c'[(R0)]
b') => c'[(R0)±] → +/-
a)' c'[(R0)] / C[(R0+)]
b)' C[(R0+)]
c)' c'[(R0)±]

b)
a → a
composed / identified
a') [(R0+)] → c'[(R0)] >/< c'[R0)] => c'/''[R0)]
b') [(R0+)] → c'[(R0)] >/< c'[R0)] >/<c'[R0)] => cδ'[R0)]
c') [(R0+)] → c'[(R0)] + c'[(R)+] => c''[R0)]

2' / A')
universal examples

B')
[(R0+)] → c'{[(R0)]}
c(di)
conjunction

a)
(R0+) → '{[(R0+)]}
simple / identified - simple

b)
a → a
composed / identified
a') [(R0+)] → c'{[(R0)]} >/< c'{[R0)]} => c'/''{[R0)]}
b') [R0+)] → c'{[(R0)] + c'{[(R0)]} => c''[R0)]}

2' / B')
universal examples.

C')
auxiliary verb

a)
[(R0+)] → c{[('R0)]}
simple / identified

b)
[(R0+)] > c'{[('R0/+)]}
composed / identified

c)
universal examples

D')
article of the noun

a)
[(R0+)] > c[('R0/+)]
definite / identified

b)
[(R0+)] > c[(''R0/+)]
indefinite / identified

Table 2.d): Formulas for Grammatical Elements / Grammatical elements from a letter

2)

III) / B) Grammatical elements from a letter

A') C/c'{'['('/'R+/!)']}

III / B')
universal examples

a)	a')	Σe''(1cn/1Cn)	[(R≠)=] ≠ [(R≠)=] =[≠(≠)≠]=
a)	b')-a)'	Σe''(1cn/1Cn)	[(R≠)=] ≠ [(R≠)=] =[=(≠)=]=
a)	b')-b)'	Σe''(1Cn/1cn)	[(R≠)=] ≠ [(R≠)=] =[=(≠)=]=
a)	c')	Σe''(1Cn/1Cn)	[(R≠)=] = [(R≠)=] =[=(≠)=]=
a)	d')	Σe''(1Cn/1Cn)	[(R≠)=] = [(R≠)=] =[≠(≠)≠]=
b)	a')	Σe''(1Cn/1Ci)	[(R=)=] = [(R=)=] =[≠ (=) ≠]=
b)	b')	Σe''(1ci/1ci)	[(R=)=] = [(R=)=] =[=(=)=]=

Table 2.e): Formulas for Grammatical Elements / Semi-independent grammatical elements

2)

IV Semi-independent grammatical elements

[(R-/0)] (sdn)i
- grammatical elements functioning as suffixoids / infixoids / prefixoids derived from complete or incomplete base grammatical elements.

c/C[+(R-/0)]
- prefixoid

c/C[(+ R-/0)]
- infixoid

c/C[(R-/0)+]
- sufixoid

C[+(R0)+]

Table 2.f) / a'): Formulas for Grammatical Elements / Fusion between basic grammatical elements and semantically independent, meaning-dependent components

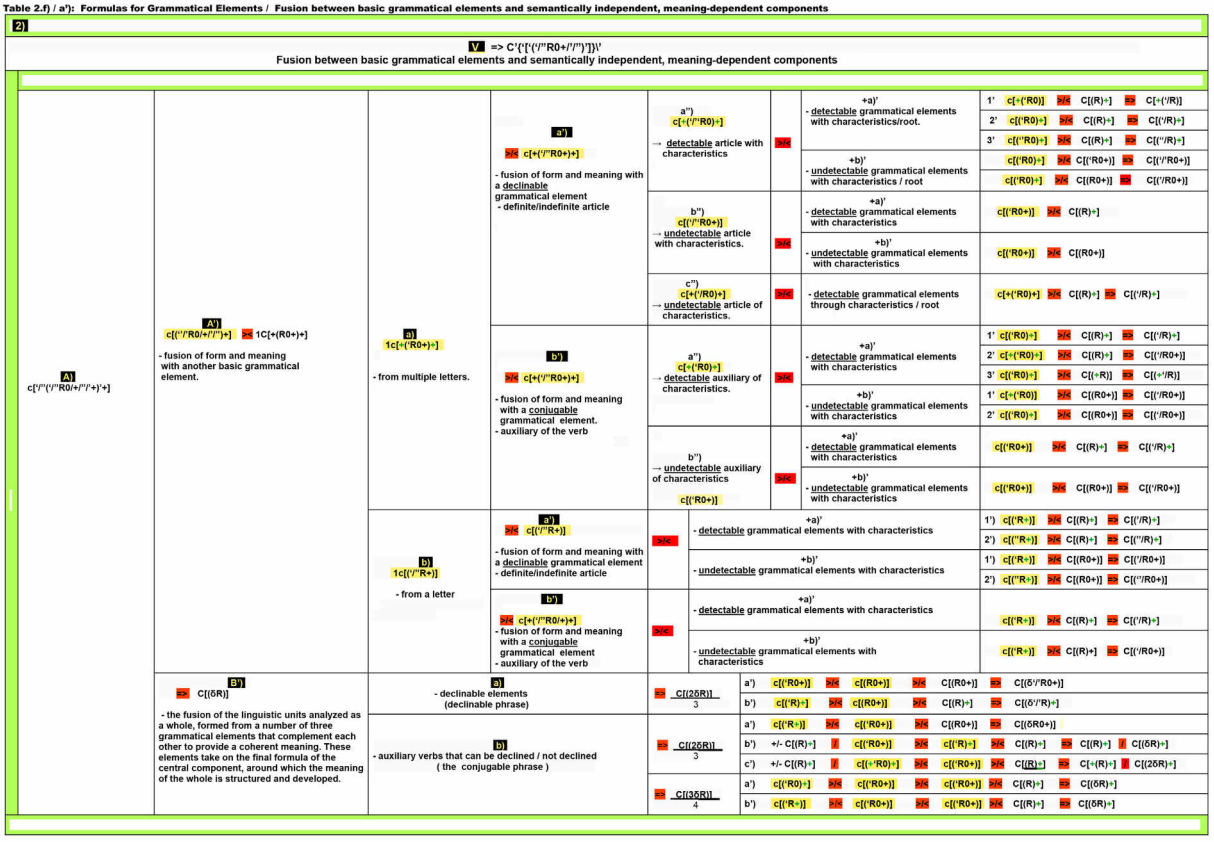


Table 2.f) / b'): Formulas for Grammatical Elements / Fusion between basic grammatical elements and semantically independent, meaning-dependent components

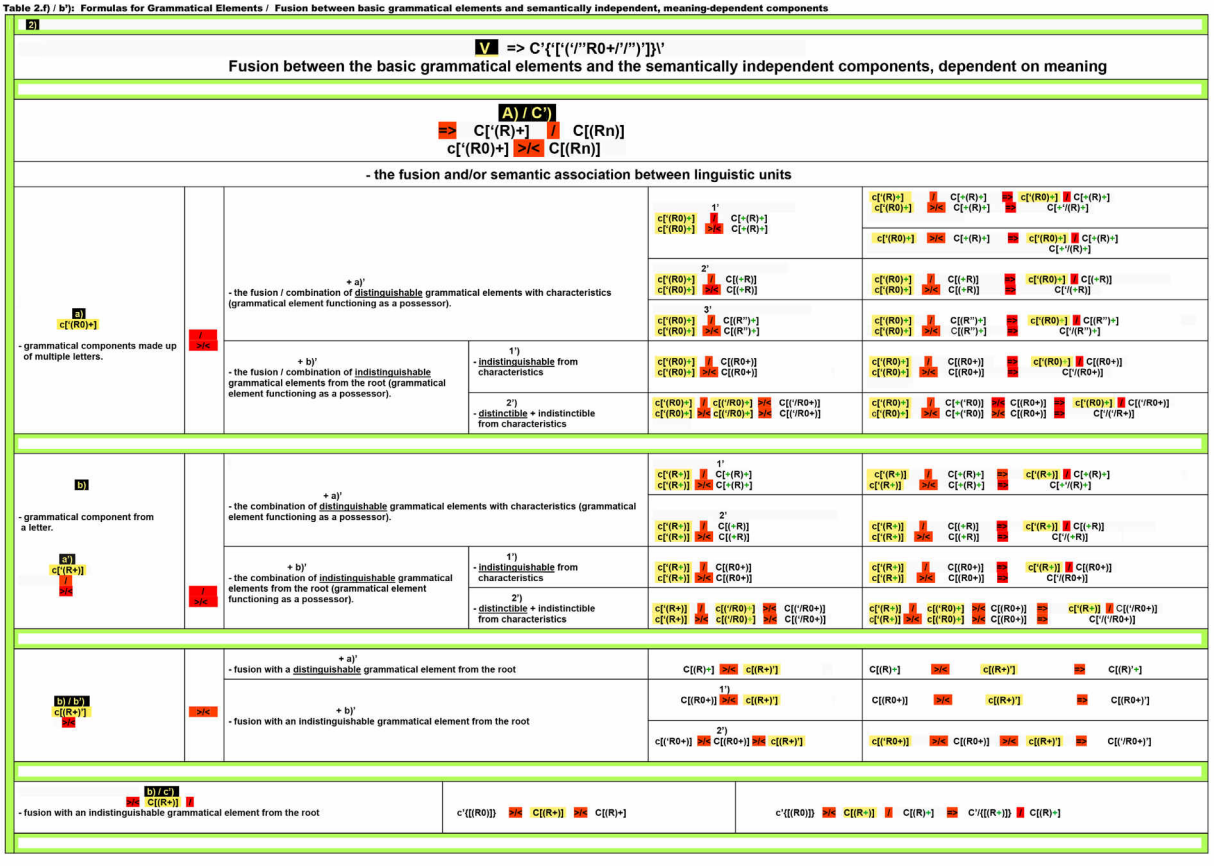
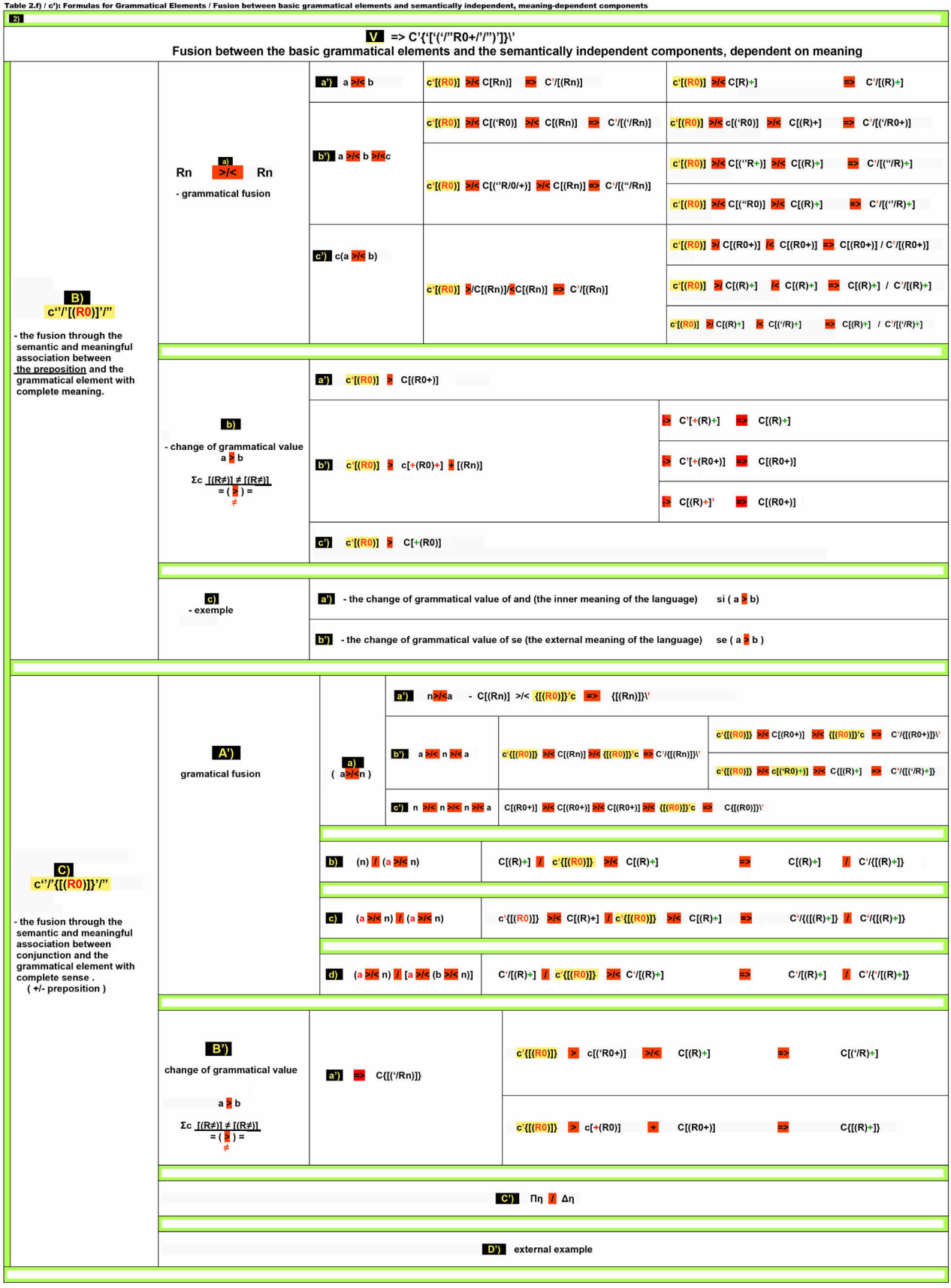


Table 2.f) / c'): Formulas for Grammatical Elements / Fusion between basic grammatical elements and semantically independent, meaning-dependent components



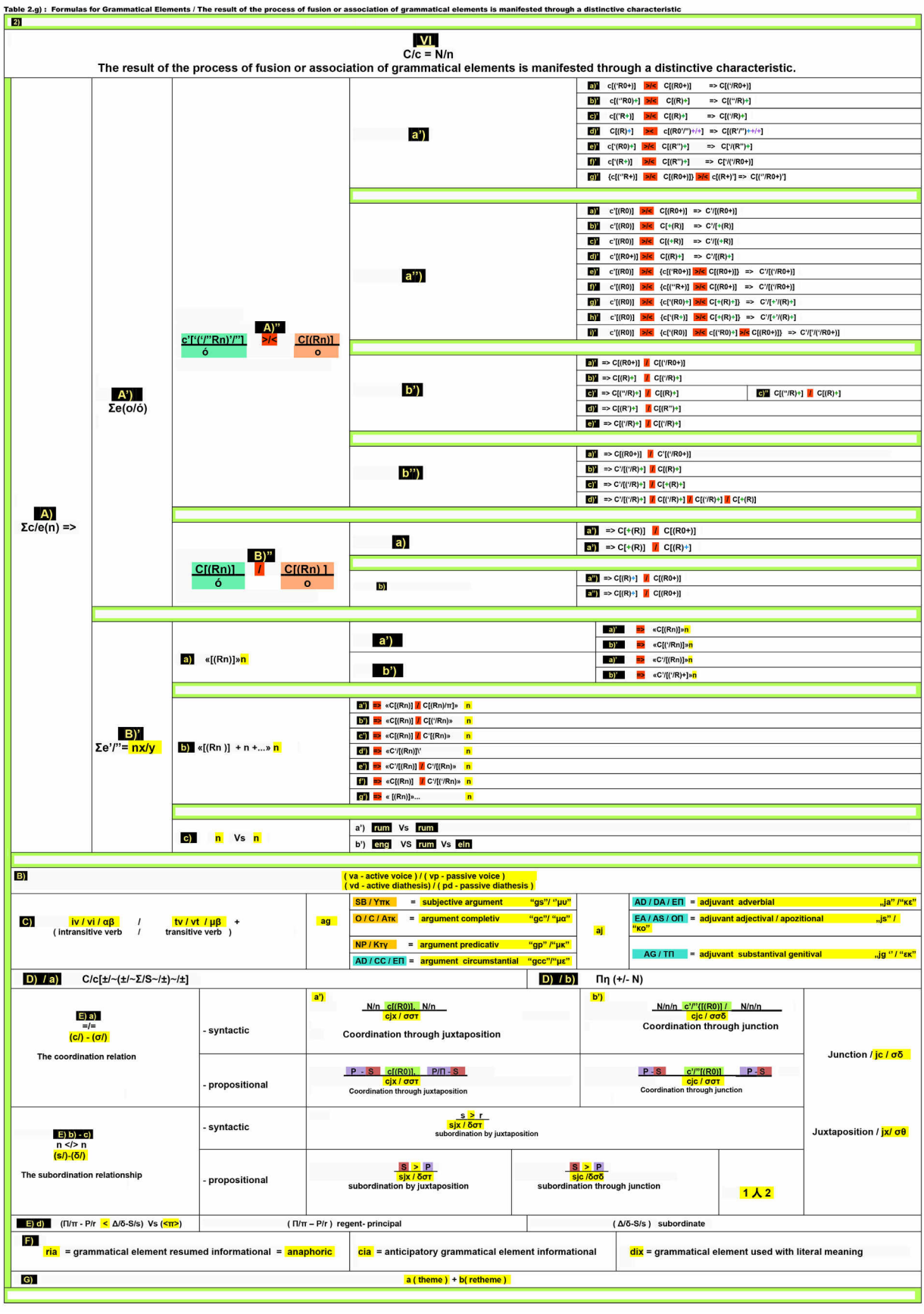


Table 2.g) : Formulas for Grammatical Elements / The result of the process of fusion or association of grammatical elements is manifested through a distinctive characteristic
VI
C/c = N/n
The result of the process of fusion or association of grammatical elements is manifested through a distinctive characteristic.
A)
Σc/e(n) =>
A')
Σe(o/ó)
B)'
Σe'/''= nx/y
B)''
C) iv / vi / αβ (intransitive verb) / tv / vt / μβ (transitive verb) +
ag
aj
D) / a) C/c[±/~(±/~Σ/S~/±)~/±]
D) / b) Πη (+/- N)
Coordination through juxtaposition
Coordination through junction
Junction / jc / σδ
Juxtaposition / jx/ σθ
The coordination relation
The subordination relationship
- syntactic
- propositional
F)
ria = grammatical element resumed informational = anaphoric
cia = anticipatory grammatical element informational
dix = grammatical element used with literal meaning
G)
a (theme) + b(retheme)

3) The expression of the process of distributing information within the grammatical element.

Table 3. : The expression of the process of distributing information within the grammatical element.

3)					
The expression of the process of distributing information within the grammatical element.					
3)/ A)	a) - Romanian language	a') The expression of the process of distributing information related to nouns in the Romanian language.			
		b')	a'') The expression of noun endings in the Romanian language that reflect gender and number.		
			b'') The expression of noun endings in the Romanian language that indicate the definite article and contain information about case.		
		c')	a)' The mathematical expression of the process of transforming the endings of nouns in the Romanian language.		
			b)' The mathematical expression of the process of transforming noun endings in the Romanian language, which represents the definite article.		
			c)' The architectural expression of the process of transforming noun endings in the Romanian language, which represents the definite article .		
		d') The visual expression of the process of distributing information of a grammatical element.		a)' noun	
				b)' pronoun	
				c)' definite article	
		e') The general informational architecture of grammatical elements with morphological value in the Romanian language.			
	b) - Greek language	a') noun	a'') The expression of the process of distributing information related to nouns in the Greek language.		
			b'')	a)' The expression of noun endings in the Greek language that reflect gender, number, and case.	
				b)' The expression of noun endings in the Greek language that reflect the definite and indefinite article, as well as case.	
			c'') The mathematical expression of the process of transforming noun endings in the Greek language that represent gender and number.		
			d'') The architectural-visual expression of the process of distributing information for a grammatical element.		
		b') verb	a'') The expression of the process of distributing information related to verbs in the Greek language.	a)' present	
				b)' past continuous	
				c)' past tense	
			b'') The mathematical expression of the process of transforming verb information in the Greek language.	a)'/ a)'' A(γράφω)	a)'/ b)'' Γ1 (γράφομαι)
			c'') The architectural-visual expression of the process of distributing information for a grammatical element.		
3)/ B)	N = N => $\frac{N}{n\{n[()n]n\}n}$				
3)/ C)	a) (n) Vs (n)				
	b) (N) Vs (N)				
3)/ D)	(N+N+N...) = Πη				
3)/ E)	$\frac{\Delta NN\eta}{n\{n[()n]n\}n}$				

4. Why the name "Formula of Metamorphosis"?

I chose the term "Formula of Metamorphosis" to describe observations related to any semantic change or modification of grammatical elements. This concept refers to both morphological changes and the static states of these elements.

Regarding morphological switches, they manifest when the letters of a word change form to express grammatical information, such as morphological value, gender, number, or case. For example, in the case of the word "**παιδί**," which becomes "**παιδιών**," the letters change to reflect a new informational value.

On the other hand, the static state of a grammatical element refers to situations where it retains its form and informational value without undergoing changes. An example of this generally includes adverbs like "aici" (here), which do not change their form in any context within a sentence.

The concept of "Formula of Metamorphosis" is not limited to these examples but extends to any situation where a change or stability in the expression of grammatical or other types of information is observed, highlighting the complexity and dynamism of language.(Quirk et al.,1985)

Transformation formulas (Table.1:Tables of Formulas for Transformation Processes) are identified and applied through concrete examples. A relevant example is the Table 1. :Tables of Formulas for Transformation Processes (e), Replacement 1) /5) B): "-/+", which illustrates how a verb changes a letter from within the word (affix – infix).

For example, in the case of "**ζ = αγόραζα**" and "**σ = άγορασα**," the letter "**ζ**" is replaced with "**σ**." This transformation signifies the transition from a continuous mode of action ("**αγόραζα**") to a concise mode of action ("άγορασα"), thus highlighting not only a formal change but also a semantic one. Depending on the context, this modification can provide additional information about the action or time.

! These letter-specific pieces of information apply only to the respective word; it does not mean that, in general, the letter "**ζ**" inherently carries information about continuous action or that the letter "**σ**" inherently carries information about concise action, corresponding to a specific meaning or color. This applies individually, depending on the respective word, grammatical rules, and the language of origin.

To illustrate grammatical transformations, we can take a hypothetical example of a grammatical element consisting of 6 letters (numbered from 1 to 6 fig.1.

„n	n	n	n	n	n”
1	2	3	4	5	6

fig.1 Hypothetical example of a grammatical element

Depending on the information that this element expresses (such as gender, number, case, or syntactic function), it can be observed which letters change and under what conditions. For example, if letter **4** changes depending on the number, we can conclude that it is associated with information about the number. In the singular, letter **4** may be present, while in the plural, it may be absent, replaced, or even added to the root of the word. To perform such an analysis, it is necessary to have the complete form of the word in all its grammatical categories (gender, number, case) and, in some cases, to also analyze its syntactic function. This way, we can verify whether the change of a letter is influenced only by certain criteria. Observations must be well-documented, and if there are no clear explanations in existing sources, a hypothesis can be formulated based on logic and concrete examples. In cases of contradictions between opinions, explanations supported by clear examples and logical reasoning will be the ones accepted.

5. Why algorithms? "R"

Algorithms are well-defined sequences of steps that enable efficient problem-solving. In the analysis of grammatical elements, they can be used to model the transformations and dynamics of these elements, reflecting the observations made.

Each type of movement, whether it is a physical movement (e.g., moving an element from position A to position B) or an informational movement (changes in morphological properties), can be associated with a specific algorithm. These algorithms formally describe how information is processed and modified in relation to the analyzed grammatical element. (Author's original research ,Ciocioc,I.V.,2024)

By using algorithms, the Formula of Metamorphosis can provide a structured and systematic representation of the observations made on grammatical elements, highlighting both static transformations (grammatical elements that do not express distinct characteristics) and their dynamics.(Author's original research ,Ciocioc,I.V.,2024)

To better understand the algorithm, we must consider the way parentheses are resolved in mathematics. First, the round parentheses **"()"** are resolved, then the square brackets **"[]"**, and finally the curly braces **"{}"**. This principle has helped me clearly and logically organize the way information and characteristics related to a word are added. (Author's original research ,Ciocioc,I.V.,2024)

The symbol '+', when used in a metamorphosis process, as shown in Table 1.c: Tables of Formulas for Transformation Processes / Addition, is utilized to solve an addition process, similar to the mathematical equation 1+1.(Author's original research ,Ciocioc,I.V.,2024)

The symbol '+', when used to express information about grammatical elements, as in Table 2.a: Tables of Formulas for Grammatical Elements, represents either a prefix c[+(R0)], an infix c[(+R0)], or a suffix c[(R0)+].(Author's original research ,Ciocioc,I.V.,2024)

However, this does not mean that '+' represents a letter. Instead, it represents information or a sum of information in the form of a prefix, suffix, or infix, Depending on the amount of information it encompasses, the corresponding color is also assigned to it.

A letter in the metamorphosis formula can generally be represented by 'n', or to assist in the precise classification and organization of a word based on the expressed information, it can be represented by 'Ø'.(Author's original research ,Ciocioc,I.V.,2024)

6. Round Parentheses ()

The main changes in meaning and semantics of a grammatical element occur at the level of affixes (prefixes, infixes, suffixes, etc.). For this reason, the algorithm can be divided into two components. An algorithmic formula for the root of the base word is represented as C(R), with roots consisting of one or more letters, indicating that the root expresses only the literal meaning, without additional information. The grammatical components are represented as c(R/0) => c(R0), a component formed of multiple letters, or c(R+), components formed of a single letter.(Author's original research ,Ciocioc,I.V.,2024)

In the case of auxiliaries, defined as grammatical components, c('R0/+') => c('R0') when they consist of multiple letters, and c('R'+) when they consist of a single letter.

For example, in Greek, the last letter of a noun typically indicates the gender or number (the color depends on the amount of information expressed in **"The color algorithm of grammatical information"- Ciocioc I.V. 2025)**. To the root of the word "**παιδ**" - **C(R)**, the letter "**ι**" - **c(R)+**, which represents the number, is added, resulting in a mathematical structure of the type "**nnnn**" (**the root**) + "**n**" (**the number**). In the plural, the letter that represents the singular number becomes part of the root ("**παιδί-**"), and another letter, "**α**", is added to it, carrying the additional information. This behavior is commonly encountered in most inflectional languages.

It can be expressed algorithmically using the semantic introduction formula C[(R+)+] from Table **1.d: Tables of Formulas for Transformation Processes / Introduction - Decomposition - Informational Division.**

To describe these changes, the added letter is assigned the algorithm **c[+(+R/0)+]**, where "**c**" represents the added component, and "**+**" symbolizes the additional information positioned relative to the base word.

The position of the added component relative to the root determines the form of the algorithm:

- if it is added as a prefix: **c+(R/0)**;

- if it is added as an infix (inside the word): **c(+R/0)**;

- if it is added as a suffix: **c(R/0)+**.

! These formulas allow for a clear and logical representation of grammatical dynamics and the relationship between the root and affixes.

After adding information to a root, it will contain characteristics related to gender, number, etc., resulting, with the help of the universal general formula of addition, in the following: (e.g., '**παιδ**' + 'ι' => **C[(R)]** + **c[(R)+]** => **C[(R)+]**). This principle applies to all grammatical elements, where the main information is attached to the base word.

Base words that do not express grammatical information differently (e.g., generally adverbs, but not exclusively) have the algorithmic formula **C[(R0+)]**, where the '**+**' is located internally, based on the principle that they contain information depending on other grammatical elements they determine or that the expressed information does not require additional grammatical components. When a base element consists of only one letter, the algorithmic formula is **C[(R+)]**.

For example, the letter '**я**' in Russian represents a first-person personal pronoun, meaning the grammatical element contains characterization information such as number and person, while the color depends on the amount of information expressed in '**The color algorithm of grammatical information**.' => **C[(R+)]**."

The types of connections of this kind will be presented in Table 2.a: Tables of Formulas for Grammatical Elements / Grammatical Components (semantically and meaning-dependent) in Chapter **2) / I)**, where **A), B), C),** and **D)** represent the algorithm's formula, while **a), b), c),** and **d)** refer to the types of connections with the root, based on the formulas from Table 1.c: Tables of Formulas for Transformation Processes / Addition. For example, in Table 2.a: Tables of Formulas for Grammatical Elements / Grammatical Components (semantically and meaning-dependent) in Chapter **2 / I / D) / A') c) 1)** , you will find the algorithmic formula c[(R)+], which expresses that grammatical information has been added to the base word in the form of a suffix, represented by the algorithm c[(R)+].

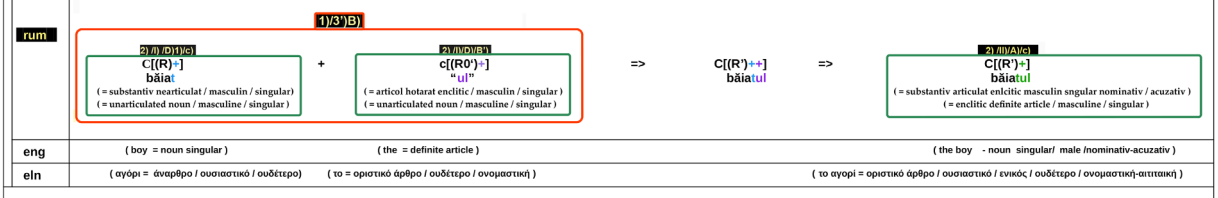
In the case of definite, indefinite, or other types of articles, as well as verb auxiliaries, we have chosen the algorithm **c[+(+'R'+)+]**, where the apostrophes represent additional information added to the basic grammatical elements. These pieces of information/apostrophes not only complement the main characteristics but also indicate their position relative to the base element.

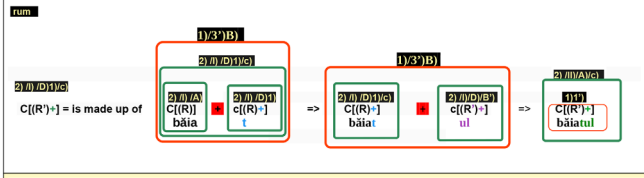
For example, in Romanian, definite articles are attached to the end of the noun root (enclitic) in the form of a suffix, according to the algorithmic formula of addition C[(R/0)+] + c[(R0/+')+] from Table 1.c: Tables of Formulas for Transformation Processes / Addition from Chapters **1) / 3') / A) / c) - 2) / I) / D) / B)**. In other languages, such as Greek, articles can be attached as auxiliaries in front of the word they modify, following the adjacency formula c[Rn)] / C[(Rn)] from Table 1.f: Tables of Formulas for Transformation Processes / semantic conjunction in Chapter **1) / 6') / A** .

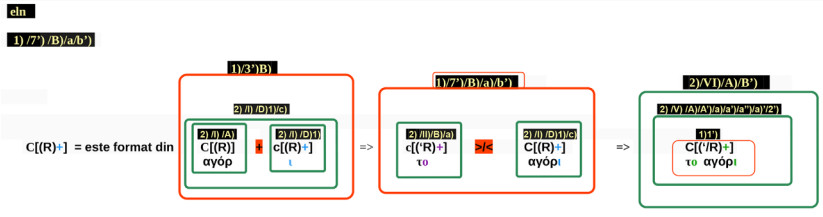
In the final description of the algorithm, it can be expressed in the form of a single formula, in which the article or auxiliary is added to the base word it modifies, resulting in the expression **C[('/R)]** . In this formula, the symbol '**/**' indicates that the grammatical element (the article or auxiliary component) is not directly attached to the base grammatical element but is adjacent to it. This structure allows for highlighting the difference from other types of articles (definite or indefinite), which, in some languages, can be attached either proclitically or enclitically.

Table 4. :Demonstrating the Grammatical Transformations of Romanian Nouns Using Algorithms and Comparative Linguistics with Greek

In the following example, we will demonstrate how a noun in Romanian can be modified using algorithms, highlighting each stage of the transformation and the formulas used, which are marked with a red frame. Additionally, we will underline the corresponding grammatical elements in the table (marked with a green frame), whether they are base words, suffixes, or articles.
Above each frame, the chapters where the modifications are explained in detail are indicated.
By translating the noun into Greek, we will highlight the differences in the way grammatical information is conveyed, as well as the semantic and comprehension algorithms used in the translation process. This approach will allow us to observe not only the structural transformations but also the variations in semantic interpretation between the two languages.







According to ''The color algorithm of grammatical information'':
+ = the letter(s) that sum up the minimum number of characteristics.
+ = the letter(s) that sum up the complementary characteristics of the previous letters and/or encompass more characteristics.
+ = the final expression highlighting the letters carrying information.

! These are grammatical elements where each letter conveys cumulative information, following the algorithm **C[+(R)+]** (for example, the pronoun in Romanian '**meu**' - mine).

7. Square brackets [ ] and curly braces { }

Square brackets **[ ]** and curly braces **{ }** represent the information added to grammatical elements that modify the meaning in a sentence and even the syntactic function, being referred to as **semantically independent/dependent grammatical components**, dependent on meaning '**c(id)**'. This principle indicates that they are not semantically attached to the base grammatical elements or, if their attachment is required according to the grammar of certain languages (e.g., the preposition in Hungarian, '**ház**ban,' where the postpositional suffix is equivalent to prepositions in other languages), they are semantically dependent components, dependent on meaning '**c(dd)**', but they do not change the status or 'function' in the sentence.

Thus, the algorithmic expression helps us differentiate between **suffixes** added to a base grammatical element **C[(R)+]** and a **preposition**

C'[+(+R+)+]' or **conjunctions C'{[+(+R+)+]}'**.

The preposition c'[(R0)]', where the apostrophe indicates the position relative to the base grammatical element whose meaning it modifies, and '**0**' signifies that there are no letters identifying the grammatical information it conveys.

! If, in some grammars, it is desired and/or identified that the letters of the preposition express the informational status of being a preposition, a '**+**' is added before the apostrophe => **c+'[(R0)] / c[(R0)]'+**.

! When the preposition consists of a single letter, it has the algorithmic formula **c'[(R+)]'**.

Table 5.a: Examples of Fusion between Grammatical Elements

2)	V) B) / a) / a')			
eng	c'[(R0)] with (= preposition) >/< C[(R)+] potatoes (= noun / plural)		=>	C'/[(R)+] with potatoes
rum	(cu = prepoziție)	(cartofi = substantiv / plural)		(cu cartofi)
eln	(με =πρόθαση)	(πατάτες = ουσιαστικό / ενικός)		(με πατάτες)

Table 5.b: Examples of Fusion between Grammatical Elements

2)	V) B) / b) / b)'					
In the following example, the preposition is transformed into a prefix of the grammatical element, which leads to a modification of its morphological value, expressed algorithmically.						
eln	c'[(R0)] από (= πρόθεση) → Σe' (R=) ≠ (R=) =[=(≠) =] > c[+(R0)] " από " (= πρόθεμα) + C[(R)+] βάλλω (= ρήμα) → C[+(R)+] → C[+(>R)+] απoβάλλω					=> C[(R)+] αποβάλλω (= ρήμα / 1')
rum	(din = prepoziție)	(" ex -" = prefix)	("- pel" = lat "-push")			(expel = verb / 1')
eng	(from = preposition)	(" re -" = prefix)	("- ping" = eng)			(resping = verb / 1')

Table 5.c: Examples of Fusion between Grammatical Elements

2)	III) A) / 2) / A') / a) / a')							
In the following example, the preposition is added as a suffix without changing its morphological value, according to the grammar of the Hungarian language. Therefore, the apostrophe is added after the bracket [ ]'								
hun	[(R0+)] → c[(R0)+]' -ban (= elöljárószó) => C[(R0+)] ház (= főnév) + c[(R0)+]' = C[(R)+]' házban (= főnév + elöljárószó)							
eng		(in = preposition)	house					(= in the house)
rum		(în = prepoziție)	casă					(= în casă)
eln		(σ- = πρόθεση)	σπίτι					(= στο σπίτι)

There are cases where a letter can modify the morphological value of a grammatical element, transforming it from a base grammatical element into a grammatical component. An illustrative example can be found in the Greek language, where the letter '**σ**' can represent either the first letter of a base grammatical element, as in the case of '**σε**', with the algorithm **C[+(R)+]**, which accumulates information related to the second person, singular.(Author's original research ,Ciocioc,I.V.,2024)

When '**σε**' is used as a preposition, according to the grammatical rules of the Greek language, being added before the word it modifies (with possible exceptions), it changes its expression formula, adopting the algorithm **c'[(R0)]**. This change reflects the structural and functional adaptation of the grammatical element in the context of the statement.

In addition, the letter '**σ**' can also function as an infix. For example, in the transformation of '**αγόραζα**' into '**άγορασα**,' the letter '**ζ**' with the algorithm **c[(R+)]** is replaced by '**σ**,' which takes on the same algorithm **c[(R+)]**. This substitution highlights the role of the letter '**σ**' in modifying the morphological structure of the word, according to the grammatical rules of the Greek language.

The conjunction c'{[R0]}' follows the same principle of apostrophization as the preposition, indicating the position relative to the base grammatical element, whose meaning it modifies, while '0' signifies the absence of letters identifying the grammatical information expressed. I consider the conjunction to have a morphological value that brings changes in meaning to a grammatical element, smaller compared to those of a preposition, or of a suffix, prefix, or infix, thus being added "last" in terms of "resolving the brackets".

Table 5.d: Examples of Fusion between Grammatical Elements

2)	III) A) / 2) / B') / a)		
eng	[(R0+)] →	c'{[(R0)]} if (= conjunction)	
rum		(dacă = comjuncție)	
eln		(αν = σύνδεση)	
ita		(se = congiunzione)	

! When the preposition is formed from a single letter, it has the algorithmic formula **c'{[R+]}'**.

8.The brackets in the tone formula

The application of brackets in **the tone formula** has different functionalities; they classify the distribution of information rather than its importance or the changes that need to be considered for the classification of grammatical elements.
That is, in the round brackets, I have added the necessary and vital semantic changes when referring to tone expressions as well as the semantic structure of the grammatical element. This formula varies depending on the grammatical element being analyzed, meaning not all the information of a noun can be expressed by an adverb, and the information of an adverb cannot be expressed by a noun. Thus, the formula adapts to the requirements."

Table 6.a: Examples of the Tone Formula in the Analysis of a Noun in Greek.

The tone formula in the analysis of a noun, the Greek language.	
(σn=>n / n / n / n)n	
! When there is no tone on the syllable being considered, '0' is added.	
(σn =>n / n / n / n)n	**σn- the total number of syllables.**
(σn =>ń / n / n / n)	**ń/** **- the type of tone category** **! I have classified the information based on the provided examples and in comparison with the mentioned languages. If I were to add more examples from various languages, it is likely that the number of categories would increase.** **The definitions and names have been taken from the languages that define them and applied in the languages that use them but do not define them.**
(σn =>n / n̄ / n / n)	**/ n /** - the name of the syllable on which the tone is located.
(σn =>n / n / n̄ / n)	**/ n /** = on which syllable the accent is placed **! The accent is different from the tone in some languages, while in others, no distinction is made."**
(σn =>n / n / n / n̄)	**/ n** = the name of the syllable that can take a tone.
(σn =>n / n / n / n) ‘/’’	**) ‘/’’** = the singular or plural number of the grammatical element.
(σn =>n / n / n / n) ‘/’’ n̄]	**n]** = the number of similar endings in different cases.
(σn =>n / n / n / n) ‘/’’ n] ‘/’’	**] ‘/’’** - available forms.
(σn =>n / n / n / n) ‘/’’ n] ‘/’’} n̄	**}n̄** - the total number of syllables in comparison between singular and plural – if the grammatical element has the same number of syllables in both singular and plural.

Table 6.b: Examples of the Tone Formula in the Analysis of a Noun in Greek.

- the grammatical element is composed of 2 syllables - disyllabic (σ2 => n / n / n / n) ‘/’’ n] ‘/’’} n,
- the tone is on the rhyming syllable.- οξύτονο ,(σ2 => n / 1 / n / n) ‘/’’ n] ‘/’’} n,
- the grammatical element is a paroxytone with the tone being the first syllable from right to left of the word. (σ2 => n / 1 / n / 1) ‘/’’ n] ‘/’’} n,

(the number of the syllable) **2** **1**

word **(ο)** **να** **-** **ός** **disyllabic – oxytone / paroxytone σ2=> n / 1 / n /1)**

(σο =1)

eln	**ναός = ουσιαστικό / ενικός**
eng	**temple = noun / singular**
rum	**templu = substantiv / singular**

Table 6.c: Examples of the Tone Formula in the Analysis of a Noun in Greek.

(σ2 > σ3 => 2 / 1=1 / 1=1 / 1=1) ‘>’’
παι-δί > παι-δι-ά
(child > children)

- the grammatical element in the singular.:(σn => n / n / n / n) ‘] }
- composed of 2 syllables. (σ2 => n / n / n / n) ‘] }
- the type of tone 2 - ń the second tone (rising tone) - rises from a lower tone to a higher one. (σ2 => 2 / n / n / n) ‘]} n,
- the tone is on the first syllable 1 - oxytone. (σ2 => 2 / 1 / n / n) ‘] }
- the accent is on the first syllable. (σ2 => 2 / 1 / 1 / n) ‘] }
- the name of the syllable that has tone 1 is 'final'. (σ2 => 2 / 1 / 1 / 1) ‘] }

Singular ()’ > plural ()’’

- elementul gramatical la plural (σn => n / n / n / n) ‘’] }
- composed of 3 syllables (σ2>σ3 => n / n / n / n) ‘] }
- the type of tone 2 - ń the second tone (rising tone) - rises from a lower tone to a higher one (σ3 => 2 / n / n / n) ‘]} n,
- the tone is on the first syllable, similar to the singular.1 = 1 - oxytone (σ3 => 2 / 1=1 / n / n) ‘] }
- the accent is on the first syllable, similar to the singular (σ3 => 2 / 1 =1 / 1=1 / 1) ‘] }
- the name of the syllable that has a tone similar to the singular 1 (final syllable) (σ3 => 2 / 1=1 / 1=1 / 1=1) ‘] }

The parentheses contributed to organizing the information added in the form of fractions in the analysis of the grammatical element from morphological, syntactic, propositional, and phrasal perspectives. Thus, depending on each level of analysis of a grammatical element, I added the relevant information, considering whether it could be expressed without explicitly mentioning the level of analysis.
In other words, when analyzing a grammatical element morphologically, I considered the necessary information such as gender, number, case, and mood. These pieces of information were expressed in or around round parentheses. Above the parentheses, I added the 'vital' information as a reference, meaning the value of the grammatical element, whether morphological or syntactic. Below, I added the necessary morphological values to express what is above the fraction.
The names of the characteristics of grammatical elements, both at the morphological and syntactic levels, were transformed into abbreviations or codes to facilitate their identification and integrate them into a fraction. Generally, these codes are derived from their definition names, using either the first letter or two or three letters. They were designed to be unique, meaning that each letter or group of letters exclusively represents a specific definition or characteristic, without repetitions.

Table 7:Exemplification of the system for expressing grammatical information using a fractional representation.

Example of the system for expressing grammatical information in a fractional system (in the form of a fraction).

noun ‘girl’’ = $\frac{\text{no}}{\text{(fm)'}}$	no - noun / female / ()’ singular

! An exception occurs when, above the fraction, the morphological value is changed, and I simply found no other solution but to use the same letter.

Verb $\frac{\text{P}}{\text{μ[()]}}$ **Adverbial modifier (Επιρρηματικός προσδιορισμός)** $\frac{\text{ΕΠ}}{\text{μ [()]}}$

Where…
μ(- monolexical = - adverbial modifiers that consist of a single word.
- monophtotic = - the verb accompanied by 1 grammatical element upon which its action is reflected.

Parentheses are also used to express the origin of grammatical elements în Table 1.n) : Tables of Formulas for Transformation Processes / The process of transformation through national-international connection chapter 1) / 13) .

- **(Rx) n** - the grammatical element originates from the respective language expressed = national grammatical element
- **[(Rx)] i** - the grammatical element has an international origin = international grammatical element
- **C[(R)]** - the root of the grammatical element is semantically dependent on meaning.

The formulations regarding the fusion of grammatical elements in the form of algorithmic expressions, as well as their representation in various contexts through transformation processes similar to mathematical operations, allow the identification of specific definitions and characteristics depending on the particular circumstances of a sentence. These approaches contribute to a deeper understanding of grammatical dynamics and structural variability within statements identified in Table 2.f) : Tables of Formulas for Grammatical Elements / The result of the process of fusion or association of grammatical elements is manifested through a distinctive characteristic chapter 2) / VI) .

Table 8.a): Examples of Formulas for Grammatical Elements / The result of the process of fusion or association of grammatical elements is manifested through a distinctive characteristic.

2) / VI) A) B') a) / b') / a)'		
	1) / V) / B) / a)	prepositional phrase / locuțiune prepozițională / προθετική φράση
rum	c'[(R0)] cu (= prepoziție) >/< C[(R0+)] tot (= adverb)	=> C'/[(R0+)] cu tot
eng	(with = preposition)	(all = pronoun)
eln	(με = πρόθεση)	(όλα = επίθετο)

Table 8.b): Examples of Formulas for Grammatical Elements / The result of the process of fusion or association of grammatical elements is manifested through a distinctive characteristic.

2) / VI) D) A) A') / A)"/ b') /a)'

determiner = adjective C[(R0+)] → determined = definite article + noun C[('/R0+)]

1) / 7') B)

eng: 2) / III) A) / 2') / D') / a) c[('R0+)] the (definite article determiner) >/< 2) / III) A) / 1') / A') / a) C[(R0+)] boy (noun determined) — determine ->

=> 2) V\ A) A') a) a') b") a)' C[('/R0+)] the / boy (definite article / noun)

singular

rum: băiatul (substantiv + articol hotărât) singular

eln: το / αγόρι (οριστικό άρθρο / ουσιαστικό) ενικό / αρσενικό

Where….

Determiner represented by the color	
Determined represented by the color	
= the transformation process highlighted or other specifications of grammatical characteristics	
= highlighted grammatical elements	
= general expression of transformation processes and grammatical elements	
/ = represents the formula from the transformation process table	
n/n/n/n/n/n	The section where the grammatical elements are exemplified from 2.B) "Tables of Formulas for Grammatical Elements."
n/n/n/n/n/n	The sections in 2.A) "Tables of Formulas for Transformation Processes" where you will find the classified information/example.

Table 3: The expression of the process of distributing information within the grammatical element presents in detail the transformation processes and algorithmic formulas associated with the grammatical elements characteristic of a language. In this context, the grammatical characteristics resulting from the fusion of elements are analyzed, being conceptualized as grammatical operations with analogies in the field of mathematics. Additionally, Tables 1 and 2 demonstrate the usefulness of algorithms in classifying and organizing grammatical data, as well as in expressing them through a formalized and systematic approach. This methodology contributes to a deeper understanding of grammatical dynamics and the way linguistic structures can be represented mathematically.

An example of a grammatical element with morphological value, such as a demonstrative pronoun, and how it is translated from Romanian into Greek and English, as well as how it is "algorithmically" translated into these languages.

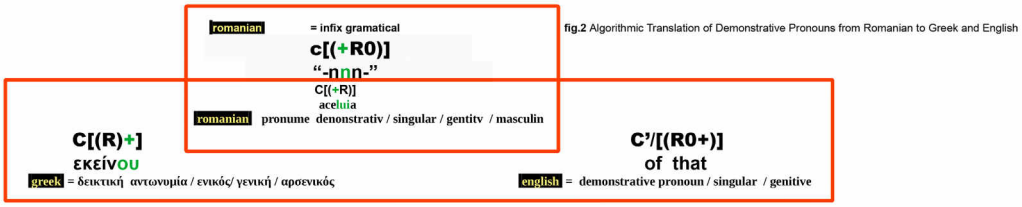


fig.2 Algorithmic Translation of Demonstrative Pronouns from Romanian to Greek and English

9. Parentheses in comparison formulas

The comparison formulas used in Table 1.k: Tables of Formulas for Transformation Processes / Comparison in Chapter 1 / 11'), by delimiting information with the help of parentheses, allow for a flexible expression of the characteristics of each word and the volume of information being compared, applicable in both national and international analyses of grammatical elements. The national analysis highlights the similarities and differences among grammatical elements, emphasizing the complexity of their interactions in generating coherent meanings within a language, while the international analysis explores these relationships across various languages, revealing structural, functional, and semantic diversity. This comparative approach contributes to a deeper understanding of the diversity and complexity of intercultural communication, with a particular focus on morphological structure.

Table 9.a: Examples of Formulas for Transformation Processes / Comparison

	rum C'/[(R)+] pe masă	pol C'/[(R0+)] na stole
Σe(2Ci/2Ci) [(R 1 = 4') 3 ≠ 3'] 2 ≠ 2' [(R 1 = 1') 3 ≠ 3'] = { = [≠ (=) ≠] = } = 4'	Σe(2Ci/2Ci) / - international comparison between the sums of grammatical elements	
	1 similar inner meaning (R=) => the grammatical element expresses the same meaning (om the table = position) ≠ (on the table = position)	
	2 = different formulas] ≠ [	C'/[(R)+] ≠ C'/[(R0+)]
	3 = different pronunciation) ≠]	
	1' = similar morphological value (=)	(= preposition + noun) (preposition + noun =)
	2' = semantic differentiation [≠ ( ) ≠]	pe masă (≠) na stole
	3' = the similarity of the number of grammatical elements = [( )] =	2 / 2
	4' = the same position of the grammatical elements = { } =	C'/[(R)+] = C'/[(R0+)] c'[(Rd)]/C[(R)+] c'[(Rd)]/C[(R0+)]

"2' and 3' are also reflected in the parentheses of expansion 'dsi' / contraction 'csi' / semantic informational equality 'esi'."

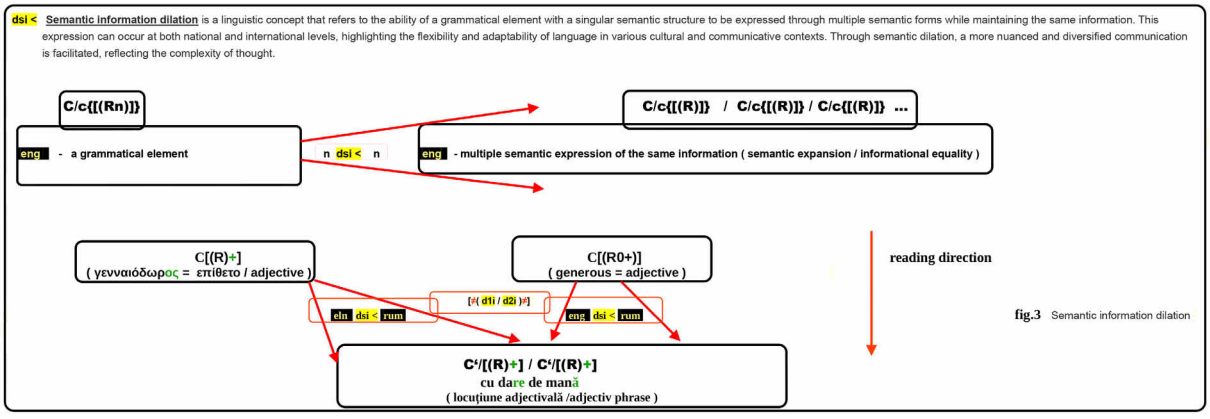


fig.3 Semantic information dilation

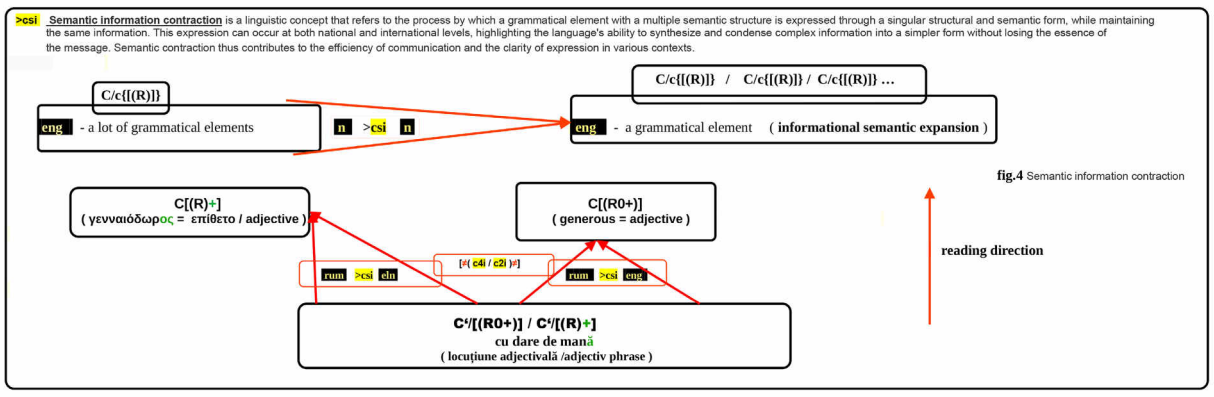


fig.4 Semantic information contraction

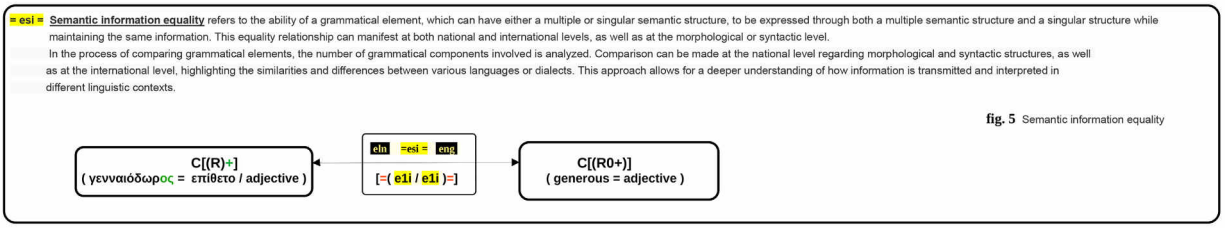


fig. 5 Semantic information equality

10. Formula of Grammatical Time

The formula of grammatical time involves the algorithmic transformation of grammatical tenses and modes of action, being essential for clarifying temporal sequences and the characteristics of actions..

Table 10.:Formula of Grammatical Time

Grammatical tenses
$\frac{PNn(n)}{\{[n(n)]\}}$
Grammatical tense refers to a specific category of the verb that indicates the time at which an action, event, or state occurs. It is categorized into three primary types: present, past, and future. Each tense highlights the temporal relationship of the action relative to the moment of speaking, contributing to a clearer understanding of the context in which the verb's action occurs, aiding in the organization of sentence structure, and influencing how the message is perceived and interpreted. (1),(Ciocioc, I. V. ,2024)
The realizable/unrealizable action (depending on circumstances) is influenced along the temporal axis by various grammatical elements that determine this axis, such as adverbs of time, conjunctions, or other grammatical elements that clarify the temporal distinction. (2) .(Ciocioc, I. V. ,2024)
The mode of action of verbs refers to the form a verb takes to express the nature and character of an action, as well as its relationship with other actions or states. This concept is essential for understanding how the speaker perceives and communicates the action. (3) .(Ciocioc, I. V. ,2024)
The voice of the verb is a grammatical feature that indicates the relationship between the subject and the action expressed by the verb. (4) .(Ciocioc, I. V. ,2024)
Diathesis is a grammatical concept that refers to how a verb expresses the relationship between its subject and the action it denotes. Diathesis vs. Voice: While diathesis focuses on the relationship between the subject and the action, the voice centers on how the action is expressed within the context of the sentence. (5).(Ciocioc, I. V. ,2024)

Table 11.a): Mathematical Expression of Grammatical Time

Main action time on the temporal axis.		
ΠNρ	**mathematical expression of the past time** (6),(Ciocioc, I. V. ,2024)	**Past (Trecut / Παρελθόν): - an action, event, or state that took place before the moment of speaking.** (7), (Yule, G. ,2010);(Mihăilă, M. ,2003);(Giannakis, G. ,2000)
ENv	**mathematical expression of the present time** (8) (Ciocioc, I. V. ,2024)	**Present (Prezent / Παρόν): - an action, event, or state that takes place at the moment of speaking.** (9),(Yule, 2010);(Mihăilă, 2003); (Tsitsanis, 1986)
MNλ	**mathematical expression of the future time** (10),(Ciocioc, I. V. ,2024)	**Future (Viitor / Μέλλον): - an action, event, or state that will take place after the moment of speaking.** (11) (Huddleston & Pullum, 2002) (Mihăilă, M.,2003); (Tsitsanis, S. ,1986)
$\frac{N\ (é)}{n(n)}$	**mathematical expression of the concise mode of action on the temporal axis** (12) (Ciocioc, I. V. ,2024)	**- acțiunea concisă / concise action / συνοπτική δράση This refers to actions that take place at specific moments and are expressed in a direct and clear manner, without additional details.** (13) (Mihăilă,2003); (Tsitsanis, 1986)
$\frac{N\ (o)}{n(n)}$	**mathematical expression of the 'sintelesmeno' mode of action on the temporal axis** (14) (Ciocioc, I. V. ,2024)	**- înaintea altei acțiuni / before another action πριν από μια άλλη ενέργεια συντελεσμένο This refers to actions that took place before another event or action.** (15), (Biber et al., 1999);(Mihăilă, 2003); (Tsitsanis, S. ,1986).
$\frac{N\ (ε)}{n(n)}$	**mathematical expression of the continuous mode of action on the temporal axis** (16) (Ciocioc, I. V. ,2024)	**- acțiune continuă / continuous action / συνεχής δράση ατελές This refers to actions that take place over an extended period of time, without being limited to a specific moment .** (17) (Huddleston & Pullum, 2002); (Mihăilă, M.,2003); T(sitsanis, S.,1986)
$\frac{N\ n}{εv(n)}$	**mathematical expression of the active voice of the verb's mode of existence during the action.** (18) (Ciocioc, I. V. ,2024)	**active voice (ενεργητική φωνή / voce activă) - active voice is a grammatical feature that indicates the relationship between the subject and the action expressed by the verb. In active voice constructions, the subject of the sentence performs the action of the verb, directly impacting the object of the sentence, if there is one.** (19) (Huddleston, R., & Pullum, G. K.,2002) **This grammatical structure is crucial for clarity and directness in communication, as it clearly shows who or what is responsible for the action.**
$\frac{N\ n}{πθ(n)}$	**mathematical expression of the passive voice of the verb's mode of existence during the action.** (20) (Ciocioc, I. V. ,2024)	**passive voice (παθητική φωνή / voce pasivă) - passive voice is a grammatical feature that indicates the relationship between the subject and the action expressed by the verb. In passive voice constructions, the subject of the sentence receives the action of the verb, rather than performing it. This structure is used to emphasize the action itself or the recipient of the action, rather than the doer.** (21) (Huddleston, R., & Pullum, G. K.,2002)

Table 11.b): Mathematical Expression of Grammatical Time

(22) (Ciocioc, I. V. ,2024)

Generally expressed formulas, based on the names of Greek grammatical tenses, can be adapted to each language or employed using a general/universal formula.

- the mode of existence of the subject during the action	- active voice $\frac{P\ (n)}{εv(n)n}$	- passive voice (παθητική φωνή / voce pasivă) $\frac{P\ (n)}{πθ(n)n}$
- the mode of action of the subject on the temporal axis	- concise $\frac{P\ (é)}{n(n)}$	- continuously $\frac{P\ (ε)}{n(n)}$ — - before another action $\frac{P\ (o)}{n(n)}$

$\frac{PNn(n)}{n(n)}$

	PΠρ past			PEv present			PMλ future		
		- active voice	- passive voice		- active voice	- passive voice		- active voice	- passive voice
	$\frac{P(n)}{n}$	$\frac{PΠρ(n)}{εv(n)}$	$\frac{PΠρ(n)}{πθ(n)}$	$\frac{P(n)}{n}$	$\frac{PEv(n)}{εv(n)n}$	$\frac{PEv(n)}{πθ\ (n)n}$	$\frac{P(n)}{n}$	$\frac{PMλ(n)}{εv(n)}$	$\frac{PMλ(n)}{πθ(n)}$
- concise action (é)	$\frac{PΠ(é)}{n}$	$\frac{PNρé}{εv(n)}$	$\frac{PNρé}{πθ(n)}$	$\frac{PEvé}{n(n)}$	$\frac{PNvé}{εv(n)}$	$\frac{PNvé}{πθ(n)}$	$\frac{PMλé}{n}$	$\frac{PNλé}{εv(n)}$	$\frac{PNλé}{πθ(n)}$
- before another action (o)	$\frac{PΠ(o)}{n}$	$\frac{PNρo}{εv(n)}$	$\frac{PNρo}{πθ(n)}$	$\frac{PEvo}{n(n)}$	$\frac{PNvo}{εv(n)}$	$\frac{PNvé}{πθ(n)}$	$\frac{PMλo}{n}$	$\frac{PNλo}{εv(n)}$	$\frac{PNλo}{πθ(n)}$
- continuous action (ε)	$\frac{PΠ(ε)}{n}$	$\frac{PNρε}{εv(n)}$	$\frac{PNρε}{πθ(n)}$	$\frac{PEvε}{n(n)}$	$\frac{PNvε}{εv(n)}$	$\frac{PNvε}{πθ(n)}$	$\frac{PMλε}{n}$	$\frac{PNλε}{εv(n)}$	$\frac{PNλε}{πθ(n)}$

These structures serve as a model for guiding verbs in the Greek language, as their semantic framework clearly delineates the differences between concise and continuous modes, as well as the distinctions between active and passive voices.

Certain grammatical elements, such as adverbs and conjunctions, can introduce variations in the definitions of verb actions, even when other grammatical components intervene between them and the verb itself.

11. Colors

Colors contribute to highlighting grammatical information and establishing its level of importance, depending on the perspective analyzed.

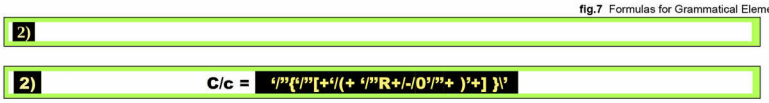
For example, the color blue has the following meanings:
- from an algorithmic perspective, it represents a minimal set of primary information necessary for characterizing a grammatical element, marked as '+', detailed in Table 1.a) : Formulas for Transformation Processes / The color algorithm of grammatical information.
- from an analytical perspective, after the algorithmic expression, it indicates the morphological value of the grammatical element. nnnn
- from the perspective of structural and semantic changes, when a grammatical element is used in another language, it symbolizes the grammatical component of international origin. [(Rn)]

In **Tables 1: Formulas for Transformation Processes** , marked in red, each transformation is accompanied by a definition and the method of applying the formulas, highlighting the fact that they can also be used in other fields.

fig.6 Formulas for Transformation Processes Expressed and Chromatic

In **Tables 2.: Formulas for Grammatical Elements** , marked in green, the emphasis is exclusively on grammatical elements and their transformation, both from an algorithmic perspective and through morphological and syntactic definitions.

fig.7 Formulas for Grammatical Elements Expressed and Chromatic



Between the two tables, **1.** and **2.** , there is a kind of paradox. First, the grammatical elements were identified, and then their details were observed, which were transformed into formulas and methods of application with interdisciplinary potential.

A '**chromatic dictionary**' expressed in '**The Dictionary of Color Algorithms and Grammatical Information, Architecturally Expressed Chromatically (Ciocioc I.V.2024)**' serves to organize the meanings attributed to different shades, correlated with the definitions and importance of grammatical information, structured according to their relevance in describing grammatical elements. By combining various colors, this dictionary facilitates the transmission of grammatical information specific to well-defined characteristics."

Table 12.a): Examples of The Dictionary of Color Algorithms and Grammatical Information

At an individual level → of the formula
- grammatical element dependent on semantics and dependent on meaning
- independent semantic and comprehensible grammatical element
- independent semantic grammatical element, dependent on meaning
- semi-independent grammatical element
- in terms of origin
- grammatical element of national origin
- grammatical element of international origin

Table 12.b): Examples of The Dictionary of Color Algorithms and Grammatical Information

At the level of the characteristics
- at the level of the characteristics of the inner / outer meaning
- at the morphological level
- at the syntactic level
- at the determinative level /
- at the propositional level. /
- additional information

Table 13: Examples of the process of transformation through national-international connection

	1) / 13')		
=>	gramatical element , semi-independent internationally (semantically dependent / dependent in meaning – prefixoid) used as [(nationally independent semantics/independent of understanding)]		
C[+(R-/0)] + c[(R0)+] =>	eln	C[+(R-/0)] + c[(R0)+] =>	C[(R)+]
		τενισ- ρίζα + τας	τενίστας (= ουσιαστικό / αρσενικό)
	eng		(noun = tennis player)
	rum		(substantiv = tenisman)

Based on the analogies between colors and grammatical information, a 'map of grammar' has been developed, in which each color occupies a specific position, established according to the order of importance in identifying the characteristics of grammatical elements."

Table 14.: The first map of grammar

The first map of grammar

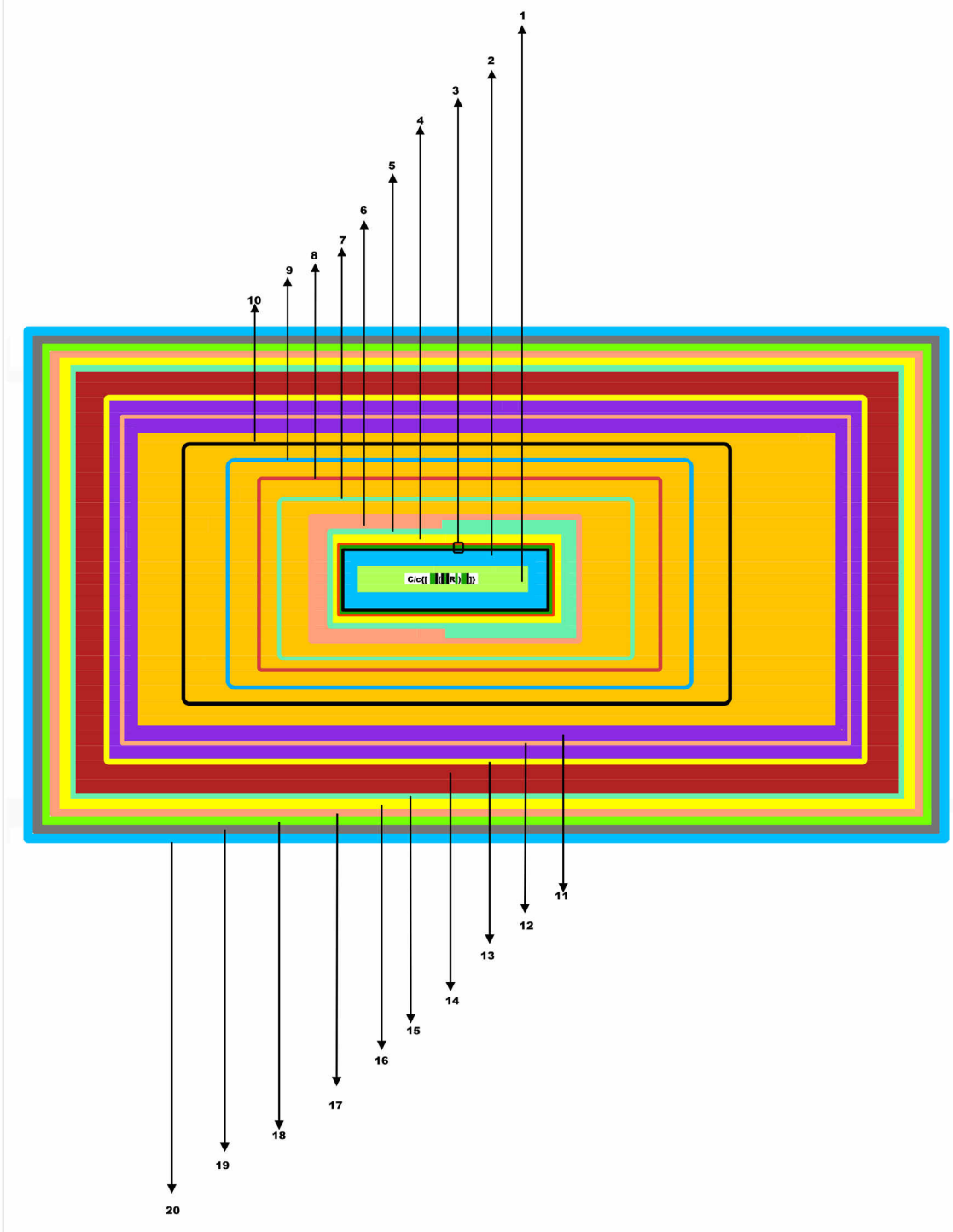


Table 15: The general expression of the characteristics of the grammatical element C/c

The general expression of the characteristics of the grammatical element C/c

1 - main / comprehensive characteristics of a grammatical element / green	2 - the characteristics of the grammatical element at the morphological level / blue
3	= the transformation process highlighted or other specifications of grammatical characteristics = highlighted grammatical elements = general expression of transformation processes and grammatical elements
4 / 13 - additional features of a grammatical element at the morphological, syntactic, or propositional level, or highlighted in certain necessary situations / yellow	
5 / 15 - morphological / syntactic grammatical element with a determining role / petrol	6 / 12 - morphological / syntactic grammatical element with a role to be determined / coral
- the characteristics of the grammatical element at the syntactic level orange	7 = determiners - petrol 8 = direct - indirect object , predicative nominal - burgundy 9 = verb - blue 10 = subject - black
11 mov , main clause / purple	14 subordinate clause / burgundy ,
16 - national grammatical element	17 - basic element , semantically independent / independent in meaning
18 - semantically dependent grammatical element, dependent on meaning (attachable grammatical components)	
19 - semi-independent grammatical element	20 - international grammatical element
- national grammatical element, semantically independent	- national grammatical element, semantically dependent and / or comprehensible
- grammatical element, independent semantic / independent understood - untransformed / attached international	
- grammatical element dependent on meaning / semantically dependent - international	
- national grammatical element, semantically independent , dependent on meaning	
- grammatical element, semi-independent / component (semantically dependent component / dependent on meaning) national	
- grammatical element, dependent on meaning / dependent semantically , international, transformed into grammatical element dependent on meaning / dependent semantically – national	
- grammatical element , semantic independent / meaning independent - international, used semantically independent / meaning independent - national .	
- grammatical element, independent semantic / dependent on meaning - national, transformed into grammatical element dependent on meaning / dependent semantic - international	
- grammatical element , semantically independent / meaning-independent - national , used semi-independently (component / semantically dependent / meaning-dependent) - international	
- grammatical element , semantically independent / dependent on meaning - international , transformed into grammatical element semantically independent / dependent on meaning - national	
- internațional semi-independent grammatical element (semantic dependent / meaning dependent) used nationally	

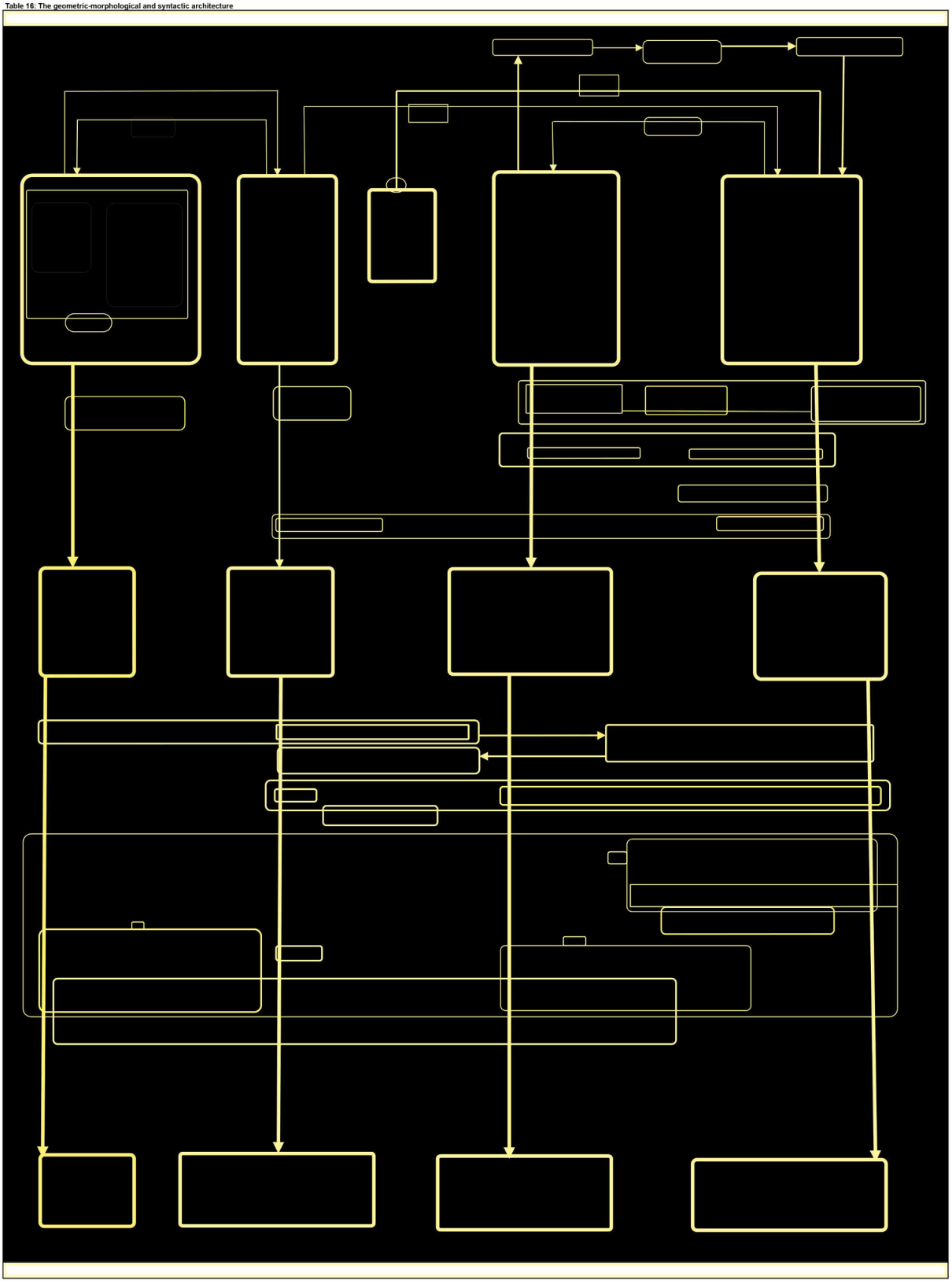
! Some grammatical information, from the perspective of their characteristics, has been taken from

! Some grammatical information, from the perspective of their characteristics, has been taken from other languages or international grammars, as these characteristics were not expressed in the respective language. This adaptation has been carried out carefully, ensuring that the borrowed terms do not contradict the rules of the grammar in which they are applied and do not overlap with other grammatical information that has the same qualities.

12. The geometric-morphological and syntactic architecture

The geometric-morphological and syntactic architecture of expressing characteristics within a sentence illustrates the connections between grammatical information, which can manifest exclusively in a logical, structured, and coherent manner. This approach highlights the interdependence of grammatical elements and their organization within a well-defined syntactic framework, thereby emphasizing the complexity and coherence of linguistic structure.

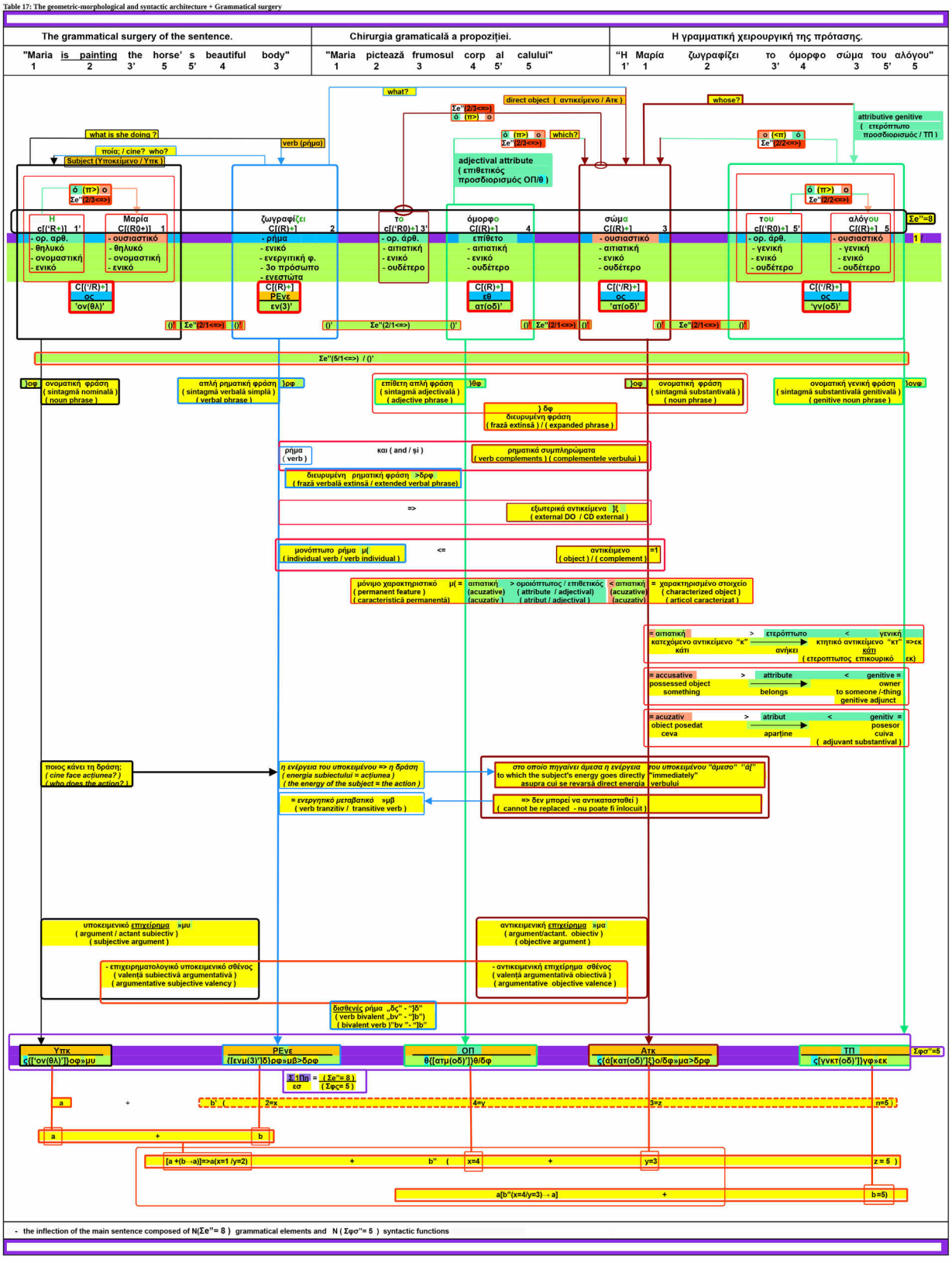
Table 16: The geometric-morphological and syntactic architecture



13. a) The geometric-morphological and syntactic architecture + Grammatical surgery

Grammatical surgery is an innovative concept that involves the 'coding' of each grammatical element according to the 'Dictionary of Color Algorithms and Grammatical Information, Expressed Architecturally in Color.' This method is subjected to detailed analysis from various perspectives, including chromatic, algorithmic, morphological, syntactic, propositional, phrasal, textual, and architectural. Through this complex approach, a meticulous identification of the characteristics of each grammatical element is facilitated, as well as the highlighting of connections between grammatical information. Thus, it contributes to a logical, structured, and coherent understanding of the linguistic system.

Table 17: The geometric-morphological and syntactic architecture + Grammatical surgery



13. b) The constituent elements identified in the grammatical surgery of the sentence

Table 18.a): The constituent elements identified in the grammatical surgery of the sentence

ο	I use " determined" / "προσδιορίζομενος "for a class of variable words whose information is specified, clarified and restricted by the determiner. (1) (Ciocioc, I. V. ,2024)		
ό	A determiner is a class of variable words that accompany a grammatical element and specify it . (2) (Ciocioc, I. V. ,2024)		
(π>)	Determines (3) (Ciocioc, I. V. ,2024)		
ορ. αρθ.	1' / 3' / 5'	definite article as determiner of the noun 1 / 2 / 3	The definite article in Greek determines a noun, specifying and clarifying information about it. In Greek, definite articles are used before nouns to indicate exactly which example of the noun is being referred to. (4) (Triandafilidis, M.,1941)
ουσιαστικό	1 / 3 / 5	noun as the determined of the article 1' / 2' / 3'	
επίθετο	4	adjective as determiner of the noun 3/3'	

Table 18.b): The constituent elements identified in the grammatical surgery of the sentence

ος	1 / 3 / 5	mathematical representation of a noun with morphological value (5) (Ciocioc, I. V. ,2024)	A noun is a word that designates a person, a place, an object, an idea, or a quality. (6) (Quirk, R., Greenbaum, S., Leech, G., & Svartvik, J. ,1985)
εθ	4	mathematical expression of an adjective with morphological value (7) (Ciocioc, I. V. ,2024)	An adjective is a word that describes or modifies a noun, adding information about it, such as quality, quantity, or state. (8) (Quirk, R., Greenbaum, S., Leech, G., & Svartvik, J. ,1985)

Table 18.c): The constituent elements identified in the grammatical surgery of the sentence

'	mathematical expression of the definite articles 1' / 3' / 5' (9) (Ciocioc, I. V. ,2024)	The definite article is a word used before a noun to indicate a specific and well-defined reference. (10) (Triandafilidis, M. ,1941)
ον(	mathematical expression of the nominative case of the noun 1 (11) (Ciocioc, I. V. ,2024)	The nominative case is the grammatical case that indicates the subject of a sentence or phrase. In the nominative case, nouns and pronouns are typically used to denote who or what performs the action of the verb. (12) (Quirk, R., Greenbaum, S., Leech, G., & Svartvik, J. ,1985)
(θλ)	mathematical expression of the feminine gender of the noun 1 (13) (Ciocioc, I. V. ,2024)	The feminine gender in the Greek language, from a grammatical perspective, refers to a category of nouns, adjectives, and pronouns that have specific forms and are used to designate persons, objects, or ideas of feminine or neutral gender. The grammatical forms of the feminine gender in Greek include specific articles, noun endings, adjectives, and pronouns. (14) (Holton, D., Mackridge, P., & Philippaki-Warburton, I. ,1997)
(οδ)	mathematical expression of the neuter case of the noun 4'/4 - 5'/5 (15) (Ciocioc, I. V. ,2024)	The neuter gender, from a grammatical perspective, is a category of nouns, adjectives, and pronouns that are not classified as masculine or feminine. In many languages, including Greek and English, the neuter gender refers to objects, abstract concepts, and sometimes to animals or people whose sex is unspecified or does not matter. (16) (Holton, D., Mackridge, P., & Philippaki-Warburton, I. ,1997)
)'	mathematical expression of the singular number of nouns 1 / 3 / 4 / 5 and verb 2 (17) (Ciocioc, I. V. ,2024)	The singular number, from a grammatical perspective, refers to the form of a word that indicates a single object, person, animal, or concept. In contrast to the plural number, which indicates multiple entities, the singular number is used to denote only one. (18) (Quirk, R., Greenbaum, S., Leech, G., & Svartvik, J. ,1985)
εν	mathematical expression active voices of the verb 2 (ενεργητική φωνή) (19) (Ciocioc, I. V. ,2024)	The active voice of verbs in the Greek language is the verbal form in which the subject performs the action expressed by the verb. In contrast, the passive voice is the verbal form in which the subject suffers the action of the verb. (20) (Huddleston, R., & Pullum, G. K. ,2002)
(3)	mathematical expression of the third person in verb conjugation 2 (21) (Ciocioc, I. V. ,2024)	The third person, from a grammatical perspective, refers to the form of the verb, pronoun, and other words that indicate someone or something different from the speaker (first person) and the person being addressed (second person). (22) (Triandafilidis, M. ,1941)
ατ(	mathematical expression of the accusative case of the noun 3'/3 (23) (Ciocioc, I. V. ,2024)	The accusative case is a grammatical case used to indicate the direct object of a verb, that is, the person or object that receives the action of the verb. In many languages, including Greek and English, the accusative case is used to show the relationship between the subject and the object of the sentence. (24) (Quirk, R., Greenbaum, S., Leech, G., & Svartvik, J. ,1985)
γν(	mathematical expression of the genitive case of the noun 5'/5 (25) (Ciocioc, I. V. ,2024)	The genitive case is a grammatical case that indicates possession, relationship, or association between two nouns. Nouns, pronouns, and other words in the genitive case usually show 'whose' something is or 'to whom' an object or person belongs. (26) (Huddleston, R., & Pullum, G. K. , 2002)

Table 18.d): The constituent elements identified in the grammatical surgery of the sentence

}οφ	1' / 1 - 3'/3	mathematical expression noun phrase (ονοματική φράση) (27) (Ciocioc, I. V. ,2024)	A noun phrase is a group of words that functions together as a noun within a sentence. Typically, this group includes a main noun along with all the words that modify or complement it, such as articles, adjectives, and other nouns or prepositional phrases. (28) (Quirk, R., Greenbaum, S., Leech, G., & Svartvik, J. ,1985)
}ρφ	2	mathematical expression for verbal phrase (απλή ρηματική φράση) (29) (Ciocioc, I. V. ,2024)	A verbal phrase is a grouping of words that contains a main verb and, sometimes, an auxiliary verb. It describes the action or state of the subject of the sentence. This combination allows the phrase to convey a complete thought regarding what the subject is doing or experiencing. (30) (Quirk, R., Greenbaum, S., Leech, G., & Svartvik, J. ,1985)
}θφ	4	mathematical expression for adjective phrase (επίθετη απλή φράση) (31) (Ciocioc, I. V. ,2024)	An adjective phrase is a group of words that contains a main adjective along with all the words that modify or complement it, such as adverbs, direct objects, or other expressions that provide additional information about the noun being described. This combination allows the phrase to convey more detailed characteristics of the noun. (32) (Quirk, R., Greenbaum, S., Leech, G., & Svartvik, J. ,1985)
}ογφ	5'/5	mathematical expression for genitive noun phrase (ονοματική γενική φράση) (33) (Ciocioc, I. V. ,2024)	A genitive noun phrase is a group of words that work together to express possession, relationship, or association between two nouns. In the genitive case, the noun that owns the object or concept is used to show 'whose' something is. (34) (Quirk, R., Greenbaum, S., Leech, G., & Svartvik, J. ,1985)
}δφ	4+3'/3	mathematical expression for expanded phrase (διευρυμένη φράση) (35) (Ciocioc, I. V. ,2024)	An expanded phrase is a group of words that includes a main element (such as a noun, verb, or adjective) along with other words or phrases that add more details or information. Essentially, it is a basic phrase that has additional elements added to provide context or clarify meaning. (36) (Huddleston, R., & Pullum, G. K. ,2002)
>δρφ	2+3'/3	mathematical expression for expanded verb phrase (διευρυμένη ρηματική φράση) (37) (Ciocioc, I. V. ,2024)	An expanded verb phrase is a group of words that includes a main verb and other elements, such as auxiliary verbs, adverbs, and other words that add more information or context to the main action. (38) (Quirk, R., Greenbaum, S., Leech, G., & Svartvik, J. ,1985)
]ξ	3	mathematical expression for external direct object. (εξωτερικά αντικείμενα) (39) (Ciocioc, I. V. ,2024)	An external direct object refers to a direct object that does not share the same root or origin as the verb it complements. In this case, the direct object is not semantically or etymologically derived from the verb and is entirely independent of it. (40) (Quirk, R., Greenbaum, S., Leech, G., & Svartvik, J. ,1985)
μ(	2	mathematical expression for individual verb (μονόπτωτο ρήμα) (41) (Ciocioc, I. V. ,2024)	An individual verb, or a monotransitive verb, refers to a verb that requires only a direct object to complete the meaning of the action. These verbs do not need an indirect object or other complements to form a complete and understandable sentence. (42) (Quirk, R., Greenbaum, S., Leech, G., & Svartvik, J. ,1985)
μ(	4	mathematical expression for permanent feature (μόνιμο χαρακτηριστικό) (43) (Ciocioc, I. V. ,2024)	A permanent feature, from a grammatical perspective, is a characteristic, trait, or attribute that is constant and does not change over time. (44) (Quirk, R., Greenbaum, S., Leech, G., & Svartvik, J. ,1985)
κ(	3	mathematical expression for possessed object (κατεχόμενο αντικείμενο) (45) (Ciocioc, I. V. ,2024)	A possessed object, from a grammatical perspective, is an object that is owned or held by another object or person, known as the possessor. This possessed object is designated to show the relationship of possession, where one entity functions as the possessor . (46) (Quirk, R., Greenbaum, S., Leech, G., & Svartvik, J. ,1985)
κτ(	5' / 5	mathematical expression for possessop object / genitive adjunct (κτητικό αντικείμενο) (47) (Ciocioc, I. V. ,2024)	A possessor object, from a grammatical perspective, refers to a noun or noun phrase that owns or possesses another object, known as the possessed object. In such structures, the possessor object indicates the relationship of possession and shows "whose" the object is. (48) (Quirk, R., Greenbaum, S., Leech, G., & Svartvik, J. ,1985)
}μβ	2	mathematical expression for transitive verb (*ενεργητικό μεταβατικό ρήμα*) (49) (Ciocioc, I. V. ,2024)	A transitive verb is a verb that requires a direct object to complete the meaning of the action it expresses. The direct object receives the action of the transitive verb and answers the questions "what?" or "whom?". (50) (Azar, B. S.,2003)
»μn	1/ 3	mathematical expression for argument / actant (επιχείρημα / συντελεστής / πράκτορας) (51) (Ciocioc, I. V. ,2024)	From a grammatical perspective, an actant/argument is a noun, pronoun, or noun phrase that is necessary to complete the meaning of a verb, adverb, or adjective. This concept is essential in understanding how different elements in a sentence interact to convey meaning . (52) (Tesnière, L. ,2015)
»μυ	1	mathematical expression for subjective argument / actant (argument / actant subiectiv) (υποκειμενικό επιχείρημα/ συντελεστής / πράκτορας) (53) (Ciocioc, I. V. ,2024)	The subjective actant (or subject) is a grammatical term that refers to the element in a sentence that performs the action described by the verb. It is essential for completing the meaning of the sentence and for identifying who or what is carrying out the action. ! You can use the same terms for actant and subjective argument because both refer to the entity that performs the action described by the verb. In linguistics and grammar, these terms are interchangeable and describe the role of the subject in a sentence. (54) (Baker, M. ,2003)
»μα	3	mathematical expression for argument / actant (argument / actant obiectiv) (αντικειμενική επιχείρημα / συντελεστής / πράκτορας) (55) (Ciocioc, I. V. ,2024)	The objective actant (or object) is a grammatical element that receives or is affected by the action described by the verb. This actant is essential for completing the meaning of the sentence and for clarifying who or what is being acted upon. ! The objective actant and the objective argument are terms that can be used interchangeably, as both refer to the entity in a sentence that receives or is affected by the action of the verb. In linguistics and grammar, these terms describe the same essential elements. (56) (Carnie, A. ,2013)
]b/δ	2 (1+ 3)	mathematical expression for bivalent verb (δισθενές ρήμα) (57) (Ciocioc, I. V. ,2024)	A bivalent verb is a verb that requires two actants /arguments to complete the meaning of its action. These two actants are usually the subject and the direct object, but they can also include the indirect object or other grammatical elements. (58) (Carnie, A. ,2013)

Table 18.e): The constituent elements identified in the grammatical surgery of the sentence

Υποκείμενο (subject / subiect)	Υπκ	mathematical expression of the subject (59) (Ciocioc, I. V. ,2024)	The subject is a grammatical term that refers to the element in a sentence that performs the action described by the verb or is the focus of the sentence. The subject is essential for completing the meaning of the sentence and for identifying who or what is performing the action or is described by the verb. (60) (Radford, A. ,2004)
PEνε	P	mathematical expression of the verb (61) (Ciocioc, I. V. ,2024)	A verb is a word that expresses an action, a process, a state, or existence. (62) (Celce-Murcia, M., & Larsen-Freeman, D. ,1999)
	Εν	mathematical representation of the action in the present tense of the verb (63)(Ciocioc, I. V. ,2024)	The simple present is a verb tense used to express habitual actions, general truths, and permanent states. (64) (Azar, B. S. ,2003)
	ε	mathematical representation of the continuous action of the verb (65) (Ciocioc, I. V. ,2024)	Actions that are continuous or repetitive and do not have a clear end. This concept is often encountered in the use of verb tenses that indicate ongoing actions. (66) (Thompson, G. ,2013)
Αντικείμενο	Ατκ	mathematical expression of the direct object. (67) (Ciocioc, I. V. ,2024)	Direct Object (άμεσο αντικείμενο) desemnează obiectul direct dintr-o propoziție, fiind elementul care primește sau este afectat de acțiunea verbului. (68) (Thompson, G. ,2013)
Ομοιόπτωτος προσδιορισμός	ΟΠ	mathematical expression of Homogeneous Modifier (69) (Ciocioc, I. V. ,2024)	The term ''Homogeneous Modifier'' (ομοιόπτωτος προσδιορισμός) refers to an adjective or noun that is in the same grammatical case as the word it describes or completes. (70) (Baker, M. ,2003)
Επιθετικός προσδιορισμός	ΟΠ θ	mathematical expression of descriptive modifier (71) (Ciocioc, I. V. ,2024)	"Descriptive modifier" (επιθετικός προσδιορισμός) in Greek refers to a qualifying or descriptive adjective that provides additional information about a noun, specifying its qualities, characteristics, or attributes. (72) (Huddleston, R., & Pullum, G. K. ,2002)
Ετερόπτωτος προσδιορισμός	ΤΠ	mathematical expression of heterogeneous modifier (73) (Ciocioc, I. V. ,2024)	The term "heterogeneous modifier" (ετερόπτωτος προσδιορισμός or etéróptotos prosdiorismós) is a grammatical term that refers to a complement in a different case from that of the noun or pronoun it describes. Essentially, it is an adjective, noun, or expression that is not in the same grammatical case as the main word it completes or describes. (74) (Huddleston, R., & Pullum, G. K. ,2002)
(ετεροπτωτος επικουρικό)	(κ = στιατικι) + ('κτ= γενική / κτητικό) => »εκ ττ »εκ	mathematical expression of heterogeneous auxiliary (75) (Ciocioc, I. V. ,2024)	An adjunct (ετεροπτωτος επικουρικό) that is in a different case adds contextual information about the possessor and the possessed object. (76) (Kolliakou, D. ,2004)

Table 18.f): The constituent elements identified in the grammatical surgery of the sentence

a = 1	mathematical expression for theme (θέμα) (77) (Ciocioc, I. V. ,2024)	The theme (θέμα / tema) refers to the known or pre-existing information in a discourse or text. It is the element being discussed and represents the starting point of the sentence. The theme helps establish the context and anchors new information in prior knowledge. (78) (Halliday, M. A. K., & Matthiessen, C. M. I. M. ,2014)		
b = 2	mathematical expression for rhema (ρεθέματο) (79) (Ciocioc, I. V. ,2024)	Rhema is a grammatical term that designates the part of the sentence that brings new or essential information, complementing the context provided by Thema. It enriches the sentence with crucial details for the complete understanding of the conveyed message. (80) (Halliday, M. A. K., & Matthiessen, C. M. I. M. ,2014)		
a(=1) + b'(x=2 /z=3/z=4/n=5) [a+(b→a)]=>a(x=1 /y=2) +b''(x=4 /x=3/z=5) a[b''(x=4/y=3)→ a] + b=5)	mathematical expression of the modification of the theme and the retheme, along with the elements they contain (81) (Ciocioc, I. V. ,2024)	In a mathematical or linguistic context, the concept refers to how the theme (the known or pre-existing information) and the retheme (the restructured or reintroduced theme) are represented or modified, using variables, functions, or other symbolic notations to describe their changes and the elements they encompass. (82) (Halliday, M. A. K., & Matthiessen, C. M. I. M. ,2014)		
Σe''= 8	mathematical representation of the number of grammatical elements with morphological value in a sentence, expressed as a sum (83) (Ciocioc, I. V. ,2024)			
Σφς= 5)	mathematical representation of the number of grammatical elements with syntactic value in a sentence, expressed as a sum (84) (Ciocioc, I. V. ,2024)			
1Πn	mathematical expression of a sentence (πρότασης) (85) (Ciocioc, I. V. ,2024)	A sentence is a fundamental grammatical unit that expresses a complete idea. It consists of a subject and a predicate and may also include other elements such as direct and indirect objects, complements, and attributes. Sentences are used to communicate facts, questions, commands, exclamations, or desires. (86) (Carnie, A. ,2013)		
Σe'' (n/n<=>) = mandatory agreement	mathematical expression of mandatory grammatical agreement (87) (Ciocioc, I. V. ,2024)	Mandatory grammatical agreement is a fundamental principle in grammar that involves the concordance between different parts of a sentence regarding gender, number, person, and case. This agreement ensures the coherence and correctness of the sentence structure. (88) (Carnie, A. ,2013)	n / - n / = the number of grammatical elements considered for grammatical agreement	/ n - / n = the number of agreements considered between grammatical elements
Σe'' (n/n<=/≠>) = optional agreement - disagreement	mathematical expression of non-mandatory grammatical agreement (89) (Ciocioc, I. V. ,2024)	Non-mandatory grammatical agreement refers to situations where certain elements of a sentence do not have to strictly adhere to concordance in gender, number, person, or case, but may do so to enhance clarity or style in the statement. Typically, this type of agreement occurs in more relaxed contexts, especially in literary style or colloquial speech, where grammatical rules may be more flexible. (90) (Corbett, G. G. ,2006)		

15. The Differences Between AI and Human Research Methods

A) Complexity and Creativity

a) Complexity

In the development of this theory, I utilized complex algorithmic formulas to analyze and model the structural and morphological transformations of language, which not only identify the patterns of these transformations but also provide a systematic and precise representation of them—something that AI cannot achieve without human guidance. (1) (Chomsky, 2015, p. 230)

The paper includes:

Chromatic and grammatical algorithms: The use of these algorithms to highlight grammatical information through color coding is an innovation that requires a deep understanding of both linguistic theory and visual and mathematical applicability.

Morphological transformations: The paper analyzes and models the transformations induced by prefixes, infixes, and suffixes, demonstrating the complexity of word formation processes and the transmission of grammatical information.

b) Creativity

The creativity of the paper emerges from the innovative way in which I combined concepts from various disciplines to develop the theory of algorithmic grammar. This includes:

The use of colors: Introducing a chromatic dictionary for organizing and coding grammatical information represents an innovative solution that facilitates the understanding and rapid processing of information. Each color represents a specific set of grammatical information, bringing a visual dimension to linguistic analysis.

The grammatical map: Creating a grammatical map for the visual organization of grammatical information contributes to a holistic understanding of the structure and dynamics of language. This method is an example of creativity in presenting and systematizing complex information.

The method of applying algorithmic formulas: Developing a systematic method for applying algorithmic formulas to model grammatical transformations adds an innovative perspective to linguistic analysis and allows for a deeper understanding of the dynamics of language.

These aspects of complexity and creativity can justify that the work "Metamorphosis Formula" could not have been created by AI, as it requires a combination of interdisciplinary knowledge, intuition, and personal experience that only a human can provide. AI, in its current form, does not have the capability to develop new theories and integrate multiple fields of knowledge in a creative and original manner. (2) (Russell & Norvig, 2021, p. 414)

B) Context and Intuition

a) Context

The work "Metamorphosis Formula" is based on a deep understanding of the linguistic, cultural, and technological context. Chomsky's research (1965) emphasizes the importance of context in linguistic analysis. In my analysis, structural and morphological transformations are contextualized within technological evolution and modern communication requirements. (3) (Chomsky, 1965)

b) Intuition

Human intuition plays a crucial role in the development of innovative theories and concepts. Personal experience and intuition are essential in making connections between concepts and formulating hypotheses. For example, in the development of the "Metamorphosis Formula," my intuition was vital in applying chromatic and grammatical algorithms to illustrate the dynamic evolution of language.

In developing the "Metamorphosis Formula," I used my intuition to create a grammatical map that visually organizes grammatical information and facilitates the understanding of linguistic relationships. I was inspired by my studies in electricity, where I analyzed the wiring connection model and the colors assigned to them. I applied these principles in creating the grammatical map and the connections between pieces of information, resulting in a systematic and clear approach.

These aspects underscore the importance of context and intuition in the development of the "Metamorphosis Formula" and highlight why AI cannot create such a document without human intervention. Intuition and an understanding of context are essential elements that require deep human experience and knowledge.

C) Highlighting Results

In the "Metamorphosis Formula," I used color coding to highlight grammatical information and facilitate understanding, allowing for more efficient learning and better retention of linguistic structures. This aspect is essential for education and natural language processing, providing an innovative method for presenting complex information. (4) (Carnie, 2013, p. 102)

The interpretation of results is a fundamental component of the "Metamorphosis Formula." This process involves a deep and systematic analysis of the data obtained through the application of algorithmic formulas and chromatic coding. By using colors to highlight grammatical information, I observed a significant improvement in clarity and comprehensibility, which facilitates the learning process and enhances retention of linguistic structures.

Additionally, the use of a chromatic dictionary for organizing and coding grammatical information contributes to a holistic understanding of the structure and dynamics of language. This innovative approach was inspired by my experience with searching for words in dictionaries during my studies of modern Greek. Such achievements were made possible through my personal intuition and experience—elements that artificial intelligence cannot replicate, as they require a profound understanding of context and human insight.

These aspects underscore the importance of highlighting and interpreting results in the development of the "Metamorphosis Formula" and illustrate why AI cannot create such a document without human intervention. Deep interpretation and intuition are essential elements that require extensive human experience and knowledge. (5) (Carnie, 2013, p. 102)

D) Algorithmic Approach vs. Human Creativity:

AI utilizes algorithms and predefined models to analyze data and generate results. These algorithms are designed to recognize patterns and process information in a systematic and rapid manner. However, AI is limited to existing data and models and cannot develop new theories or innovative concepts without human intervention. (6) (Russell & Norvig, 2021)

In developing the "Metamorphosis Formula," my creative process was influenced by the method of searching for words in dictionaries used during my years of study, as well as by experiences gained through games on various platforms, which significantly contributed to the development of creativity, prediction, and algorithmic thinking. Additionally, tackling various subjects required for exams facilitated the interconnection of information. These achievements were made possible exclusively through my personal creativity and experience—elements that artificial intelligence cannot replicate.

E) The Capacity for Adaptation

Continuous learning is an essential process in the development of human knowledge and skills. People can accumulate new experiences and knowledge throughout their lives, allowing them to constantly improve and respond effectively to new challenges. (7) (Schön, 1983)

In developing the "Metamorphosis Formula," I made a constant adaptation of the methodology as I discovered new information and developed innovative grammatical theories. This process of continuous learning and adaptation was facilitated by my flexibility and personal experience, which includes collaboration in teams, travel experiences, and the ability to adapt to new situations encountered during these journeys.

These differences highlight the importance of adaptability and continuous learning in research and emphasize why AI cannot develop new theories or respond effectively to new challenges without human guidance. The ability to continuously learn and adapt to new information and contexts is an exclusively human attribute, essential for the advancement of knowledge. (8)(Schön, 1983)

F) Judgment and ethics

a) Judgment

People use judgment to analyze information and make decisions. Human judgment involves evaluating complex situations, considering context and nuances, as well as applying accumulated experience and knowledge. AI, on the other hand, relies on algorithms and predefined data, without being able to fully understand the complexity and contextual subtleties of the situations analyzed. (9) (Russell & Norvig, 2021)

b) Ethics

Human ethics plays a crucial role in analyzing and interpreting information. People use ethical principles to guide their actions and decisions, considering the moral impact and consequences on others. AI does not possess consciousness or the ability to understand ethics, so decisions made by AI are based solely on algorithms, without taking into account ethical or moral implications. (10) (Russell & Norvig, 2021)

In the process of developing the "Metamorphosis Formula," I applied discernment and analytical skills to interpret and organize grammatical information in an ethical and responsible manner. My previous experiences, such as collaborating in teams and adapting to new situations during travels, have significantly contributed to the development of my ability to make informed decisions, considering the impact on the analyzed and exemplified information. My judgment and professional ethics have been cultivated through various work activities carried out over time, which involved interacting with people from diverse backgrounds, allowing for the development of a complex perspective and profound discernment.

These differences underline the importance of judgment and ethics in research and emphasize why AI cannot develop new theories or make ethical decisions without human guidance. The ability to responsibly analyze information and make ethical decisions is an exclusively human attribute, essential for the advancement of knowledge and ensuring ethical and responsible research. (11) (Schön, 1983; Russell & Norvig, 2021)

The "Metamorphosis Formula" represents a compelling example of the complexity and creativity required to develop innovative linguistic theories. This work demonstrates the essential role of interdisciplinary knowledge, intuition, and personal experience in formulating new theories and methodologies.

Throughout the research process, I employed rigorous and innovative methods, such as mathematical algorithms and color coding, to analyze and model the structural and morphological transformations of language. The methodology was continuously refined as new insights emerged, leading to the development of groundbreaking grammatical theories. My personal experiences, including teamwork, collaboration with individuals from diverse backgrounds, and adaptability gained through travel, have significantly enhanced my ability to make informed decisions and approach challenges with flexibility.

The study also highlights potential future applications in fields such as education, artificial intelligence, and natural language processing. The methodologies developed could improve foreign language learning processes and be integrated into technologies like machine translation systems and voice recognition tools.

By fostering a deeper understanding of grammatical evolution and opening new avenues for educational methods and advanced language processing technologies, "Metamorphosis Formula" underscores the limitations of AI while emphasizing the indispensable role of human creativity and intuition. This work contributes meaningfully to the advancement of linguistic knowledge and offers innovative perspectives for enhancing communication and understanding of language.

"It took eight years from the first spark of inspiration to the completion of the final algorithm, an endless and vibrant waltz between numbers and letters, a bold chromatic dance that wove a story of innovation and discovery. A kaleidoscope of ideas and colors, each contributing its own note to the symphony of research. In these moments, the rays of a new beginning emerge, harmoniously connecting imagination and reality, opening new horizons of possibilities."

Ciocioc Ion Valentin