

RESEARCH PROJECT 2020-2027
MODELS-PROCESSES - METHODS-TECHNOLOGIES NLP¹
Research topic: Natural Languages,² Natural Language Processing NLP³, Digital Intelligence ⁴
R. BUCCIARELLI

¹ https://it.wikipedia.org/wiki/Informatica_umanistica

² <https://www.greelane.com/it/humanities/inglese/what-is-a-natural-language-1691422/#:~:text=Un%20linguaggio%20naturale%C3%A8%20un%20linguaggio%20umano%2C%20come%20l%27inglese,il%20linguaggio%20della%20logicaformale.%20Chiamato%20anche%C2%A0%20linguaggio%20ordinario.>

³ https://blog.osservatori.net/it_it/natural-language-processing-nlp-come-funziona-lelaborazione-del-linguaggio-naturale

⁴ <https://www.consapevolmenteconnessi.it/intelligenza-digitale/>

Research theme: Communication in digital : From homo loquens to homo smart: contractualism in the third millennium.

Focus: Literary communication in digital: A communicative process from human intelligence to artificial intelligence

Observation area: Literary communication in digital: techniques-technologies and models. ⁵

Segment: 1-Humanae litterae digital text exploration ; Segment :2-Automatic digital text; Segment :3-Implementation and Digital Intelligence.

Segments in the search path: 1-; Humanae litterae digital text exploration⁶; 2-Automatic digital text; 3-Implementation and Digital Intelligence.

Disciplines involved

Digital human literature, computational philology, computational linguists, quantum computing, artificial intelligence: AI

Scientific collaboration

Max Silberztein,⁷ Université de Franche-Comté Besançon France dip. ELLIADD

Disciplines : Syntax Semantics Data Mining Computing in Social science, Arts and Humanities. Skills and expertise :Corpus Linguistics Grammar Computational Linguistics Morphology Natural....

M. Planat⁸ FEMTO-ST :Michel Planat FEMTO-ST (Besançon) and Quantum Gravity Research (Los Angeles USA) Besançon, France expert in Quantum Computing, Institute of Femto-ST Dept. of Micro Nano Sciences and Systems (MN2S), Besançon, France.

Ahmida Bendjoudi⁹ PhD (Loop Quantum Gravity)Programmer & Researcher at Human Life Programming Language.Algeria. Human Life Programming Language

Éric Poirier :, directeur des programmes de traduction et directeur par intérim du Département- Langues modernes et traduction | Université du Québec à Trois-Rivières

Maria Terrone¹⁰ Professional Master per la rete mobile di Poste italiane in seno DTO e DPO

Colomba la Ragione¹¹: Managing Director at Università Telematica PegasoItaly

⁵ <https://www.bing.com/search?PC=PV03&FORM=PVSBD&q=La+comunicazione+letteraria+in+digitale>
<https://www.dipsumdills.it/tx-course/comunicazioneletterariadigitale/>
[https://www.dipsumdills.it/Dialogo sulle traduzioni tradizionali e digitali: nuove prospettive per la traduzione letteraria](https://www.dipsumdills.it/Dialogo+sulle+traduzioni+tradizionali+e+digitali:+nuove+prospettive+per+la+traduzione+letteraria)

⁶ https://www.corriere.it/cultura/11_gennaio_08/letteratura-elettronica-internet-rastelli_7e3dfbd4-1af9-11e0-8e74-00144f02aabc.shtml#:~:text=Si%20tratta%20degli%20esponenti%20della%20cosiddetta%20eLiterature%20%28Letteratura,dell%27opera%20ma%20lo%20strumento%20stesso%20della%20sua%20creazione.

⁷ <https://www.researchgate.net/profile/Max-Silberztein>

⁸ <https://www.researchgate.net/profile/Michel-Planat>

⁹ <https://www.researchgate.net/profile/Ahmida-Bendjoudi>

¹⁰ teacher at Athens Institute for Education and ResearchItaly

¹¹ <https://www.researchgate.net/profile/Colomba-La-Ragione-2>

Andrea Fernanda Rodrigo¹²Rosario National University Department: Centro de estudios de Tecnología educativa y herramientas informáticas de procesamiento del lenguaje.

Javier Julian Enriquez¹³Master in Languages and Technology Politècnica de València

Pasquale Villari : Professional Master per la rete mobile di Poste italiane in seno DTO e DPD e responsabile IT e Digital Trasformation di Sidemed.

Spain

2019 – 2023 research studies and analyzes the areas Natural Language - Natural Language Processing NLP, Digital Intelligence. It proposes a mathematical model/framework able to formalize various complex phenomena in research fields: humanae litterae, theoretical linguistics, computational linguistics, computer numerical philology with automatic calculation and software engineering. The segments of the path are: 1- Humanae litterae electronic literature; 2-Automatic digital text; 3- Implementation and Digital Intelligence. The research is involved only for segment1- 2 Automatic digital text; 3- Implementation and Digital Intelligence.

Segment: 1 Humanae litterae digital text exploration¹⁴;

The aim is to give certainty to the computational analysis of texts. We welcome interventions that include methods and tools for the computational analysis of texts, also with historical reflections on the evolution of research up to the most recent theoretical frameworks of reference. This includes approaches to the analysis of literary texts and corpora, which touch on computational models for literary criticism on the one hand, and linguistic and computational linguistics research, including natural language processing techniques, on the other. This section welcomes reflections on methods and projects also in the field that are not strictly humanistic.

CERTIFIED SKILLS REQUIRED AND MODALITIES:

An innovative research methodology made possible thanks to the collaboration of scholars from the scientific community of ResearchGate, a network in which scientists offer their contribution and support each other in the research process. The validity of the search results can be found by search interest score of research articles on ResearchGate. For comparison by publication date, by comparison by discipline, etc.

PHASES OF THE RESEARCH:

A- PREVIOUS EXPERIENCE

Studies and insights: Textual typologies, study of Chinese-Arabic languages ASL-LIS

1. Project: Linguistic resources for automatic generation of natural sign language; Study and insights on linguistic structures: linguistic mechanisms (transformational and distributional); Reflections on textual typologies and a forecast calculation for the production of online languages

¹² <https://www.researchgate.net/profile/Andrea-Rodrigo>

¹³ <https://www.researchgate.net/profile/Javier-Julian-Enriquez>

¹⁴ https://www.corriere.it/cultura/11_gennaio_08/letteratura-elettronica-internet-rastelli_7e3dfbd4-1af9-11e0-8e74-00144f02aabc.shtml#:~:text=Si%20tratta%20degli%20esponenti%20della%20cosiddetta%20eLiterature%20%28Letteratura,dell%27opera%20ma%20lo%20strumento%20stesso%20della%20sua%20creazione.

00144f02aabc.shtml#:~:text=Si%20tratta%20degli%20esponenti%20della%20cosiddetta%20eLiterature%20%28Letteratura,dell%27opera%20ma%20lo%20strumento%20stesso%20della%20sua%20creazione.

2. Project: technologies and new communication models for ESP digital intelligence teaching; Substantial differences and linguistic mechanisms and new ESP communication models
3. Project Digital intelligence: technological models – processes new generation software for the codical transformation of calculations and super calculations, for the production of corpus, local grammars and M. Silberztein database; Digital Intelligence Word Tool, P. Villari; M. Terrone, F. Terrone; R. Bucciarelli et al. editing, translation and text reformulation in real time.

B: SURVEY PROJECTS

EXPERTS BY FIELD:

Studies and insights in an overview: Mathematics, quantum physics, philosophy, Humanae litterae, Philology, Psychology, etc.

Project: digital literary communication: techniques and models DPH: validation and implementation of quantum physics: analysis: phono- tonal analysis.

Quantum calculation for detecting the emotional triplet described in the Fano Plane.

1.1 Musicological model as a scientific study of music ¹⁵

1.2 The numerical sequence from the Fibonacci series and the golden ratio in a comparison with the musical forms¹⁶

Focus : connections between music and mathematics , repeating number (recursivity), Fibonacci sequence ¹⁷

Hypothesis : Relationship music poetry: Recursiveness an emotional calculation. Sequence reflection = number group¹⁸

1.3 Project: Homer digital communication design in a quantum society: smart technologies and digital intelligence

The Homeric tradition : mirror metaphor in DPH or comparative phrases. Studies focus on the group relationship in the theory of sentence realizations of sentence groups. Numerical group and sentence group relationship in number theory for the solution of sentences (or paraphrase to homologate sentences).

Concentrations: Fibonacci series : number group (number theory) and phrase group, reductions and equivalences (Planat et al) interconnections and roles of mathematical language in formal languages.

¹⁵ [https://www.treccani.it/enciclopedia/musicologia_\(Enciclopedia-Italiana\)/](https://www.treccani.it/enciclopedia/musicologia_(Enciclopedia-Italiana)/)

¹⁶ <https://www.musica-spirito.it/musica-2/filosofia/sequenza-di-fibonacci-e-note-musicali/>

¹⁷ <https://www.musica-spirito.it/singolo-pavane-faure-musica-a-432-hz-integrale/>: *Pavane Op. 50 is a composition by Fauré that will be part of a CD composed of Musica a 432 Hz Integrale. It is a research work that I have been carrying out for some years with which I intend to find the connection between music, mathematics and awareness. For example, this piece is composed in the key of E minor, a scale that has strong emotional characteristics and that interacts with the frequencies of the sixth Chakra (the third eye). Fauré's beautiful and expressive melody allows the music to speak.*

¹⁸ <https://www.studenti.it/sequenza-di-fibonacci-significato.html> *di Fibonacci sono numeri interi e quindi, come accennato, lievemente approssimati rispetto all'effettivo valore di S.A. di un segmento, quest'ultimo, al contrario, sempre espresso da un irrazionale. Per conoscere l'esatto valore della S.A. di 144 (a) è sufficiente moltiplicare il nostro numero per 0,618..., coefficiente, questo (Le Nombre d'Or), ottenuto dalla formula di seguito esposta e a sua volta derivata dall'equazione iniziale di cui sopra:*

1.4 Project – Experimentation in: the digital text workshop cloud, new solutions for super computing environments.

FOCUS: In the concept of similarity there is the concept of synthetic homology.

Deductions: 1- the first formal process starts from mathematical languages, 2- a possible process for data transfer from NLP to IA.

PREVIOUS EXPERIENCE IN USING 2020-2023 PRODUCTS

1-PROJECT: LINGUISTIC RESOURCES FOR AUTOMATIC NATURAL SIGN LANGUAGE GENERATION

STUDY: Benchmarking of the Arabic language; Sign language ASL-LIS

EXPERT: A. Bendjoudi, Textual forecasting model

Acquired experience

Study of natural languages and analysis of distribution and transformation mechanisms with scientific validation (Arabic language - ASL sign language, LIS) Modeling of the linguistic approach and language processing technologies for the presentation of the Avatar-based sign language with calculation of prediction of technical theories of text and calculation of Bendjoudi models, A. (2020). Available at:¹⁹

<https://www.researchgate.net/messages/98511228>

https://scholar.google.com/scholar?cites=15974111092154392022&as_sdt=2005&sciodt=0,5&hl=it:

- Newton's experimental linguistic equations of gravity.
- Mathematical principles of natural language processing Part II: Cycle coordinates in practice.
- The mental coefficients of the second order.
- Experimental linguistic equations - First class.
- On the conflict between degrees of freedom and precision parameters in experimental linguistic equations.
- Experimental linguistic equations in practice.
- Experimental linguistic equations of the second kind.

https://www.researchgate.net/publication/339150012_Mathematical_and_Physical_Analysis_of_NLG_Language

Search Interest Score: 39.5; Compared to all research elements: The research interest score of this article is more than 95% of research articles on ResearchGate. Comparison by publication date: The research interest score of this article is higher than 98% of research articles published in 2020. Comparison by discipline. The research interest score for this article is more than 97% of research articles related to information technology and politics.

PUBLICATIONS

- Bucciarelli, R., et al. "Mathematical and physical analysis of NLG languages". (2020) Mathematical and physical analysis of NLG languages.
https://scholar.google.com/scholar?hl=it&as_sdt=0%2C5&q=A.+Bendjoudi&btnG=

¹⁹Elliott, R., Glauert, JR Kennaway, JR, Marshall, I. & Safar, E. (2008). Linguistica Modeling and Language -Processing Technologies for Avatar- Based MR Language Presentation _ Universal Access in the Information Society, 6(4), 375-391.

- LANDI, E. Bucciarelli R.; LANDI, A. From grammar to poetic text: linguistics lessons. Loffredo Editore Naples, 2000. Bucciarelli, R., Falco, V., & Savarese, G. (2018). Language resources for automatic generation of natural sign language. EDUCATION & TEACHING. International Journal of Education and Training Sciences, 16 (2), 13-24.
https://scholar.google.com/scholar?hl=it&as_sdt=0%2C5&q=Ritamaria+Bucciarelli++&og=R.
- Bucciarelli, R. (2014). Lexicography for the description and analysis of the linguistic corpus. Training and Teaching, 12 (4), 389-396.
https://scholar.google.com/scholar?hl=it&as_sdt=0%2C5&q=A.+Bendjoudit&btnG=
- https://scholar.google.com/scholar?hl=it&as_sdt=0%2C5&q=Ritamaria+Bucciarelli++&og=.
- R Bucciarelli, R., M., & Villari, P. (2016). Work tools: tablets for inclusive education. EDUCATION & TEACHING. International Journal of Education and Training Sciences, 14(2), 203-210.
https://scholar.google.com/scholar?start=10&q=Ritamaria+maria+Bucciarelli&hl=it&as_sdt=0.5

2- PROJECT: TECHNOLOGIES AND NEW COMMUNICATION MODELS FOR ESP DIGITAL INTELLIGENCE TEACHING

General objectives: to transfer the different textuality (ESP-DPH) LNG-NLP by applying cloud techniques.

Brief focus on: ESP professional languages.

Description of: languages and input methodology for professional word processing.

STATISTICS

https://www.researchgate.net/publication/333017162_Technologies_and_new_communication_models_for_a_didactic_of_digital_intelligence_ESP.

The research interest score of this article is higher than 98% of research articles on ResearchGate.

Comparison by publication date: The research interest score of this article is higher than 99% of research articles published in 2019. Comparison by discipline: The research interest score of this article is greater than 98% of research articles related to: Computer Science in the Social Sciences, Arts and Humanities.

https://www.researchgate.net/publication/330728178_Technologies_and_languages_in_the_society_of_acronyms/stats.

The research interest score of this article is more than 96% of the research items on ResearchGate.

Comparison by publication date: The research interest score for this article is higher than 99% of the research entries _ published in 2019.

Comparison by discipline: The research interest score for this element is higher than 97% of the research entries related to: applied mathematics.

PUBLICATIONS

- Ritamaria Bucciarelli, Roberto Capone, Marianna Greco, Javier Julian Enriquez, Francesca Santoro, Raffaele Marcone, Francesco Saverio Tortoriello (I), Technologies and new communication models for teaching digital intelligence ESP (September 2019). Technologies and new communication models for teaching ESP digital intelligence. In *New methods of teaching and learning Ememitalia 2019* (Vol. 8)
<https://hal.science/hal-03725354/>

- R. Bucciarelli Capone, FS Tortoriello, M. Greco, G. Savarese, Javier Enriquez, Learning Analytics - Scientific description and heuristic validation of NLG languages in volume 15, n. 3 (2019) Journal of e-Learning and Knowledge Society - Focus on: Learning Analytics: for a dialogue between teaching practices and educational research, 251-261 R. Bucciarelli. <https://hal.open-archives.fr/hal-03690838>).
- Bucciarelli, R., Marcone, R., Santoro, F. and Dolci, C. (2017). Technology and languages of the new economy. *Salerno IRIS in the text (Bucciarelli, 2017)*.
- https://issue.com/pensamultimedia/docs/f_i_unique-compressed.

Segment :3- Implementation and Digital Intelligence.

3- DIGITAL INTELLIGENCE: TECHNOLOGICAL MODELS – PROCESSES

Experts and author of the software: P. Villari, M.Terrone, F.Terrone; R. Bucciarelli et. Al.

[https://www.researchgate.net/publication/337945944_Intelligenza_digitale_Word - Tool modelli tecniche e tecnologie L-MI](https://www.researchgate.net/publication/337945944_Intelligenza_digitale_Word_-_Tool_modelli_tecniche_e_tecnologie_L-MI)²⁰

Research interest score: 46.2; Compared to all research elements: your paper's research interest score is higher than 96% of research articles on ResearchGate. Comparison by publication date: Your paper's research interest score is higher than 98% of research papers published in 2019. Comparison by discipline: Your paper's research interest score is higher than 96% of related research articles: Education in Mathematics.

Software:

© Type Race M. Renda, A R. Bucciarelli team of POLO University of Salerno, corpus of lemmas for completing words and sentences and paraphrases of sentences

©Digital Intelligence Acro – Word R. Bucciarelli; P. Villari, MF, R. Marcone, F. Santoro: DB language development environments and text reformulator with cloud techniques of natural languages.

©Word-Tool, R. Bucciarelli; P. Villari, FM, M. Greco, R. Marcone, F. Santoro: Text editor for text formulation and conversion of NG language (L1 into L2), real-time translator.

PUBLICATIONS

- Bucciarelli, R., M., & Villari, P. (2016). Work tools: tablets for inclusive education. Training and teaching, 14 (2 Suppl.), 203-210.
https://scholar.google.pt/scholar?hl=it&as_sdt=0%2C58q=Work-Tools%3A+Tablet+for+Inclusive+Education&btnG=.
- Bucciarelli, R., Falco, V., & Savarese, G. (2018). Language resources for automatic generation of natural sign language. Training and teaching, 16 (2 suppl.), 13-24.
https://scholar.google.pt/scholar?hl=en&as_sdt=0%2C58q=Linguistic+resources+for+automatic+generation+of+natural+sign+language&btnG=.

²⁰ <https://accademiadellacrusca.it/it/contenuti/banche-dati-corpora-e-archivi-testuali/6228>

4- PROJECT: DIGITAL LITERARY COMMUNICATION: DPH TECHNIQUES AND MODELS: VALIDATION AND IMPLEMENTATION OF QUANTUM PHYSICS²¹

EXPERTS : Online communication

Michael Planat, Marcelo M. Amaral ; mud Fang ; Raymond Aschheim ;

Max Silberzstein ; Andrea Fernanda Rodrigo

<https://www.researchgate.net/publication/344626660> DPH Validation and implementation of quantum physics the Fano solving plan of Dantesque Rhetoric

Statistics Search Interest Score 56.7 Recommendations 162 Law 560: Out of all research elements: The search interest score of this article is higher than 97% of research articles on ResearchGate. Comparison by publication date: Your paper's research interest score is higher than 99% of research papers published in 2020. With regard to the discipline: the research interest score of his article is higher than 97% of research articles related to artificial intelligence, computational linguistics. The search interest score of this article is higher than 97% of algorithm-related research articles.

Model : Musicological-quantum

Objectives

Sentiment analysis; Recursive processes -comparison of models: Dante Alighieri between rhetoric and graphs; Sentiment analysis: Comparative analysis, The Fano plane-based analysis of the *Adagietto in Visconti's death in Venice* – Dante Alighieri *La Divina Comedy*.

Skills to be acquired: Recursive processes and structures with particular reference to recursion in the linguistic field. Recursive transition networks for the elaboration of applications of techniques and quantum theories of understanding: Tonal analysis comparison B: Focal analysis DA, the purpose is to describe the emotional traits of Dante's tercet with a guiding process of Fibonacci theories. Transfer data into a formal language for emotion detection and use linguistic computational tools for scientific validation.

Overview of study approach and skill requirements

Guide text: M. Planat two - letter words and a fundamental homomorphism- The dominant geometric linguistic context.

1. Understanding the problem (file. Mat): MUSIC-LOGIC STUDIES IN Kurt Friedrich Gödel for a vision of a logician, philosopher, and mathematician. From Gödel's theorem for feedback for axiomatic reasoning. DEF extension Theorems axiom rules, Mumon and Godel.
2. Recursive structures and processes (Gödel, Escher, Bach p. 137.160), Linguistic recursion, descriptions and calculation systems²².
3. The generative lexicon of J. Pustejovsky to outline a theory of lexical semantics, in the Qualia structure theory and interesting studies for computational tools and lexicology.
4. Studies for the description and application of graph theory as part of network science²³.

Guide text analysis:

²¹ : <https://www.dantecommedia.it/>

<https://www.dantecommedia.it/index.html?ms=Triv&n=45&page=22v>

²² Gödel, Escher, Bach: un'Eterna Ghirlanda Brillante: ADELPHI

²³ dagli usi, l. A. B. D., & lessicali, d. Lessicografia e dizionari elettronici.

- ✓ M. Planat two - words of letters and a fundamental homomorphism, the dominant geometric linguistic context I-for the understanding of the problem (fil. Mat): STUDIES OF MUSICAL LOGIC IN Kurt Friedrich Gödel for a vision of a logician, philosopher, mathematician, from Gödel's theorem to feedback for axiomatic reasoning, DEF extension Theorems rules of the axiom, Mumon and Godel.²⁴
- ✓ 2- Recursive structures and processes (Gödel, Escher, Bach p. 137.160), Recursive linguistic descriptions and calculation systems.²⁵
- ✓ The generative lexicon of J. . Pustejovsky²⁶ to outline a theory of lexical semantics, in the theory of the structure of *Qualia* and interesting for studies for computational tools for lexicology.
- ✓ Studies for the description and application of graph theory belonging to Network Science²⁷.

Acquired experience

Disassembly of sentences in semantic theory theories of groups and graphs, theories of quantum physics investigation of SA in relation to the formal sphere. It is about recursiveness in musical and linguistic structures and in the concept of geometric structures, mathematical functions, physical and automatic theories.

Deepening: Recursive processes -Comparing models: Dante Alighieri between rhetoric and graphics; Objectives: Sentimental analysis: Comparative analysis The flat analysis of Fano of the Adagietto in the death of Visconti in Venice – Dante Alighieri the Divine Comedy. –

Description: Recursive processes and structures with particular reference to recursion in linguistics, _ recursive transition networks for the elaboration of applications of techniques and theories quantum comprehension: Comparison _ tonal analysis B: Phonic analysis DA Fine is to describe the emotional traits of Dante's triplet with a test guide from Fibonacci theories. Transfer data into a formal language for the detection of emotions and the use of computational language tools for scientific validation.

MM.FF.NN. M. PLANAT: Communications and documents to support vision:

- Planat, M.; Aschheim, R.; Amaral, M.M; Fang, F.; Irwin, K. (2016), Quantum information in protein codes, 3-manifolds and Kummer surfaces, *Symmetry* 2020, 13, 1146.
- Planat, Michel, et al. "Quantum computing and measurements from an exotic space-time R4". *Symmetry* 12.5 (2020): 736.
- Planat, Michael. "It from qubits: how to draw quantum contextuality." *Information* 5.2 (2014): 209-218.
- Planat, Michael. "Two-letter words and a fundamental homomorphism that governs geometric contextuality." *arXiv preprint arXiv: 1605.07118* (2016).
- Planat, M., & Saniga, M. (2007). On Pauli's charts from N-qudits. *arXiv preprint quant-ph/0701211*.

Michel Planat presents a quantum vision of the Paradise triple of the *Divine Comedy* Canto XXXIII and Hell of the Divine Comedy Canto III. In the triangle of Fano, we count with the support and methods of communication through ResearchGate.

²⁴ *Formally finished undesirable phrases i Principia Mathematica and related Systems* « Monthly Issues for Mathematics and Physics', Vol. 38, 1931 . Available in a translation in [English](#) by Martin Hirzel , 2000, [which is](#) In the [Internet Archive](#) Archived from the original on 19 March 2012.

²⁵ Gödel, Escher, Bach: an eternal brilliant garland: ADELPHI

²⁶ Mastrofini, R. (2007). Il lessico verbale dell'italiano come L2: tipologie di errore e rilevanza del contesto. *Il lessico verbale dell'italiano come L2*, 1000-1035.

²⁷ from uses, labd, & lexicals, d. Lexicography and electronic dictionaries

Notifications M. Planat research hypothesis: Reading - support - expert judgment
<https://www.researchgate.net/messages/inbox?page=30>

- <https://www.researchgate.net/messages/70162360>
- <https://www.researchgate.net/messages/71778362>
- <https://www.researchgate.net/messages/65447704>
- <https://www.researchgate.net/messages/50816412>
- <https://www.researchgate.net/messages/70162360>
- <https://www.researchgate.net/messages/1838633013>
- <https://www.researchgate.net/messages/138638810>

Project Continuation – Topology of the Word

This line of research, provisionally sketched here as it developed between 2020 and 2024, has since been completed and is presented in full — scientific premise, method, test corpus, and complete publication record — in Section 6, *Project Continuation – Topology of the Word*, at the end of this document.

5. EXPERIENCE PROJECT: HOMER DIGITAL COMMUNICATION DESIGN IN A QUANTUM SOCIETY: SMART TECHNOLOGIES AND DIGITAL INTELLIGENCE (Project: Technologies, Robotics, and Nanotechnologies for digital teaching)

Experts : online communication

Mathematical model data collection process

Michael Planat, Marcelo M. Amaral ; mud Fang ; Raymond Aschheim ;

Max Silberzstein ; Andrea Fernanda Rodrigo

<https://www.researchgate.net/publication/342987547> SMART

[TECHNOLOGIES AND DIGITAL INTELLIGENCES CROSS TECHNIQUES AND VALIDATIONS](#)

Research interest score: 54.1 -82.72% Recommendations -11.65% Full-text reading- 5.64% of all research items. The search interest score of this article is more than 96% of research articles on ResearchGate, Comparison by publication date, and Computer Science in Mathematics, Natural Sciences, Engineering and Medicine. The research interest score of this article is higher than 99% of research articles published in 2020. Compared to the discipline, the article on the research interest score of this article is higher than 97% of the research articles related to: Computer Science in the Social Sciences, Arts and Humanities.

Tools: Analysis of probabilistic calculation of elements in semantic Web environments for quantum computing using the NooJ system, Digital Intelligence A.W

Objective

The Homeric tradition in the phrase DPH The metaphor of the mirror to describe a world, a culture, a tradition; Transformation of literary text into digital text - Natural Language Processing NLP²⁸.

Description

Reconstruct a scientifically valid computational and mathematical quantum linguistic model that focuses on the process of reducing a digital transformation, but above all present a linguistic model of lexicon-grammar and

²⁸ [Natural Language Processing, what it is, how it works, applications and Python \(ai4business.it\)](#)

diz LEF for the reduction of verses into classes and categories a scientific process that starts the transformation of verse from a Greek code into a formal code.

Comparative phrases in the metaphor of the mirror - Homer is told that philology cannot be reconstructed and therefore the metaphor of the vine in the comparative form of the imaginary of the tradition of a people can be the necessary mechanism for DPH and as a fixed sentence lends itself well to being translated into acronyms, graphs and diz. Electronic.

Products:

<https://www.femto-st.fr/en/node/2955/submission/4627>

Bucciarelli, R., Tortoriello, F. S., Rodrigo, A. A., Enriquez, J. J., La Ragione, C. C., & Veronesi, I. (2021, February). Smart technologies and digital intelligence. In *Webinar series in Theories and Practices of the Annotation through Domain-Specific Languages Fall 2020-Spring 2021* Ritamaria Bucciarelli et al., *Smart technologies and digital intelligence*. <https://cophilab.ilc.cnr.it/euporia2021/slides/08-bucciarelli-et-al-ita.pdf>.
<http://www.ilc.cnr.it/it/content/webinar-euporia-2021-euporia-2021->

<https://hal.science/hal-03741253>

5. PROJECT – EXPERIENCE: THE DIGITAL TEXT WORKSHOP CLOUD, NEW SOLUTIONS FOR SUPER COMPUTING ENVIRONMENTS

Project: ²⁹ Graphic coverings to study non local structures of communication descriptions analysis validations
magazén : lieux -méthodologies -processus et validations

Research interest score: 14.7: Compared to all research items

This article's research interest score is higher than 89% of research articles related to: Computational Linguistics; Respect by discipline

The research interest score for this article is higher than 87% of the research articles related to: Theory of Computation

Reference model

Graph Coverings for Investigating Non-Local Structures in Proteins, Music and Poems; Michel Planat, Raymond Aschheim, Marcelo M. Amaral, Fang and Klee Irwin:

- Planat, M., Aschheim, R., Amaral, MM, Fang, F., & Irwin, K. (2021). Charts for the study of non-local structures in proteins, music and poems. *Skiing*, 3 (4), 39: <https://www.mdpi.com/2413-4155/3/4/39/htm>.

Description

Process of analogy: The team produces analogies: we explore structural similarities in three different languages, the first in protein language whose primary letters are amino acids, the second in musical language whose

²⁹

https://www.researchgate.net/publication/355116190_GRAPHIC_COVERINGS_TO_STUDY_NON_LOCAL_STRUCTURES_OF_COMMUNICATION_DESCRIPTIONS_ANALYSIS_VALIDATIONS_Magazen_Lieux_-methodologies_-processus_et_validations/stats

Versione pubblicata: TECNOLOGIE E NUOVI MODELLI DI COMUNICAZIONE PER UNA DIDATTICA DELL'INTELLIGENZA DIGITALE ESP

primary letters are annotated, and the third in poetic language whose primary letters are in the alphabet.³⁰ We come to a mathematical theory. Our mathematical theory of secondary structures in proteins, music and poetry is based on *the concept of a finitely generated group and corresponding graphic super positions, as explained in the Planat project "Mathematics and poetry, in view of machine learning" et al (2021), we thought that our current group theoretical approach of protein language³¹... It could be converted into an understanding of poetic language, as well as an understanding of some...* In this article, French physicists have already worked out an automatic process by reducing classes and categories into groups, according to finite groups, and we, the team, reported their results in Nooj's grammar.

Objectives: the mathematical theories of M. Planat have been transferred into formal linguistic structures

Descriptions of techniques: Based on the assumptions produced by the M. Planat et al. team, we proceed : - 1- Data transfer of the sequence Seq. 2 XVI of Boudelaire's text from mathematical code , with quantum detections (SA) to lexico-grammatical code (Nooj) ;2- Data transfer in Nooj Environment for graph construction and analysis for frequency validation , 2.1 Construction of Corpus and local grammars , 3 - Translation -reformulation and editing of the text in digital

Thus, the transformation of input textual typology (literary into target typology) fixed, homologous and synthetic is achieved

Reading - support - expert judgment

-Graph Coverings for Investigating Non Local Structures in Proteins, Music and Poems

Diego Moretti: <https://www.researchgate.net/messages/104282490>

We report below : The analysis features , the graphs , the translations and the reformulations made with the software on the GPT model

<https://www.femto-st.fr/en/Research-departments/DISC/Research-groups/AND>

Description of reproduction: French language - digital language: reformulation in French language³²

Seq. 2 XVI

Les Chinois voient l'heure dans l'œil des chats.

[...] The kid from the Celestial Empire hesitated first; then, changing his mind, he answered: I will tell you. Few Moments later he reappeared, holding a very big cat in his arms , and looking him, as they say , straight in the eyes , he affirmed without hesitation : "It 's not quite noon yet." "What was true [...]

An irrefutable validation in the mathematical logic of data transfer from narrative textual typology to digital typology and beginning of a formal process³³

³⁰: [Graphic Designer Michel Planat , Raymond Aschheim , Marcelo M. Amaral , Fang Klee Irwin p](#)

³¹Page 2 seq _ 3 ,

³² Graphs , linguistic analysis and calculation of co-occurrence phrases were performed with Nooj software . Translation and reformulation texts were performed with Digital Intelligence software .

³³ Graph Coverings for Investigating Non Local Structures in Proteins, Music and Poems Pag 2

Michel Planat 1,*

,† , Raymond Aschheim 2,† , Marcelo M. Amaral 2,† , Fang Fang 2,† and Klee Irwin 2,†

*Graph coverings and group actions are closely related.
Let us start from an enumeration of integer partitions of d that satisfy.....*

Table 1. The number $\text{Isoc}(X; d)$ for small values of first Betti number r (alias the number of generators of the free group F_r) and index d . Thus, the columns correspond to the number of conjugacy classes of subgroups of index d in the free group of rank r .

r	$d = 1$	$d = 2$	$d = 3$	$d = 4$	$d = 5$	$d = 6$	$d = 7$
1	1	1	1	1	1	1	1
2	1	3	7	26	97	624	4163
3	1	7	41	604	13,753	504,243	24,824,785
4	1	15	235	14,120	1,712,845	371,515,454	127,635,996,839
5	1	31	1361	334,576	207,009,649	268,530,771,271	644,969,015,852,641

Le Gamin du Céleste Empire ... Ce Qui était Vrai.	Card. Seq. of cc of Subgroups	r
3 letters: $\text{rel} = C^2 H^5 C^2 H^7 H^6 E^6 C^7 C C^4 C C^2 E^8 C \dots$	[1,3,7,34,131]	2
4 letters: $\text{rel} = C^2 H^5 A^2 H^7 H^6 E^6 C^7 C C^4 C C^2 E^8 C \dots$	[1,7,41,636,14364]	3
5 letters: $\text{rel} = C^2 H^5 A^2 H^7 H^6 E^6 B^7 C B^4 C C^2 E^8 C \dots$	[1,15,235,14376,]	4

pag 9

Fibonacci series computation, homophone iteration³⁴

*The game / of cé / on 2 ste 3 E 5 mpire 8 h 13 sita first; then, delighting in it, he replied: "I will tell you
1 1235813*

Phrase M. Word or idomatics = The Chinese see the time in the eyes of cats.

... .. looking at it, as they say, in the whites of the eyes... = N O V as C I

NooJ Max Silberztein³⁵ -Digital Intelligence W.T CHAT GPT Technologies R. Bucciarelli et al.³⁶

- M. Renda, A R. Bucciarelli team of the POLO University of Salerno, corpus of lemmas for completing words and sentences and paraphrases of sentences.

³⁴ The recursive technique has been conducted on the elementary calculation of syllables and on the phonic repetition of a phonic analysis (Silvestri 2014, p. 214)

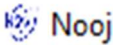
³⁵ <https://atishs.univ-fcomte.fr/nooj/index.html> Develop linguistic resources to formalize various linguistic phenomena at the orthographical, lexical, morphological, syntactic and semantic levels, for any natural language (Linguistics).

→ Create your own corpora of texts, apply these linguistic resources to them and then perform various statistical analyses in Corpus Linguistics and Digital Humanities.

→ Use NooJ's engine and linguistic resources to construct Natural Language Processing applications.

³⁶ https://www.linguistics.unisa.it/gruppidiricerca/ling_comp/gruppo1: Il Laboratorio "Maurice Gross", cui il gruppo afferisce, si occupa di diverse ricerche come la creazione di grammatiche formalizzate delle lingue europee, con particolare attenzione per l'italiano, per il quale sono state già realizzate ampie classificazioni lessico-grammaticali, dizionari elettronici e grammatiche locali basate sulla creazione di automi a stati finiti. Il software di analisi linguistica maggiormente utilizzato è NOOJ, programma per il trattamento automatico del linguaggio naturale elaborato da Max Silberztein, evoluzione di INTEX a cui Silberztein ha lavorato nel decennio 1992-2002 sotto la guida di Maurice Gross al LADL.

- Digital Intelligence Acro – Word R. Bucciarelli; P. Villari, MF, R. Marcone, F. Santoro: DB language development environments and text reformulator with cloud techniques of natural languages.
- Word - Instrument, R. Bucciarelli; P. Villari, FM, M. Greco, R. Marcone, F. Santoro: Text editor of text formulation and reconversion of the NLG language (L1 into L2), real-time translator .fig.

Digital Environment Nooj M. Silberztein ³⁷  .38

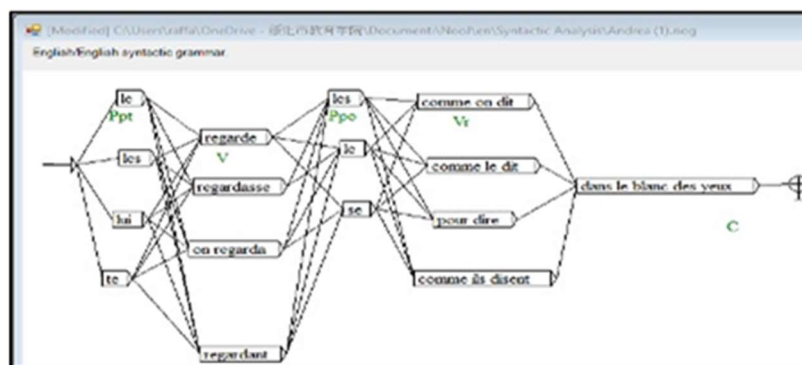


Fig. Grafo looking at it, as they say, in the whites of the eyes... = N O V as C I

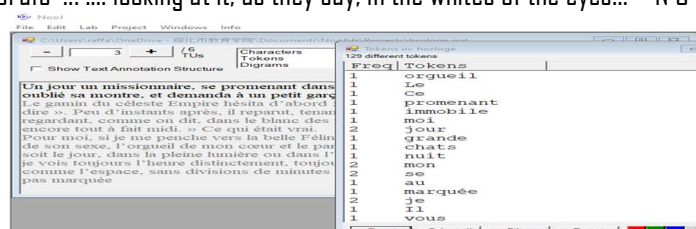


Fig. Linguistic analysis and token detection

A tribute and a translation

Fig Environment Digital Intelligence Word Tool R.Bucciarelli ;P. Villari et all.

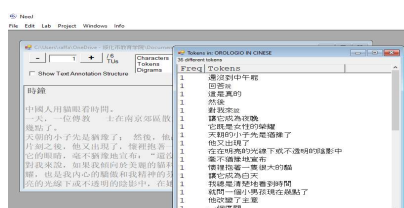


³⁷ Nooj M. Silberztein digital environment: production of graphs and syntactic analysis was reproduced by the authors for domains

³⁸ Graphs syntactic analysis and supercomputation was performed on Nooj program by Ritamaria Bucciarelli and Andrea Fernanda Rodrigo

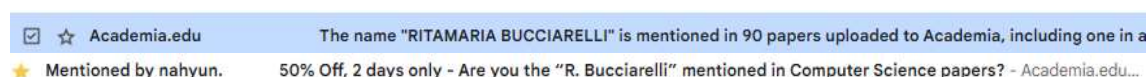
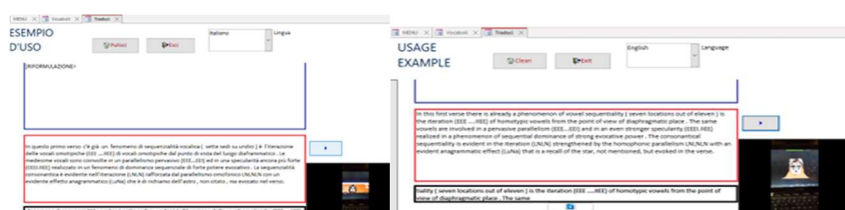
³⁹ Local grammars and corpuses were constructed with Adalta system software system of Mathematics. performed by R. Bucciarelli, F.Tortoriello , I Veronesi . With the Digital Intelligence W. Tool were translated and edited and translated from the French language , into English and Chinese by the team of ric Finally, the two software were used to obtain a reformulation test

Translation: Transfer of C. Baudelaire's text into digital languages (translation from French into Chinese)



Linguistic analysis and token detection software NooJ

William Shakespeare⁴⁰: A tribute : phonotonal analysis a reformulation of a language in the musicality of tenses



PUBLICATIONS

- Veronesi, I., Bucciarelli, R., Tortoriello, FS, Rodrigo, A., Greco, M., , C., & Enriquez, J.J (2023, January). The reason for the digital text cloud workshops, new solutions for super computing environments. In *Formalizing Natural Languages: Applications to Natural Language Processing and Digital Humanities: 16th International Conference, NooJ 2022, Rosario, Argentina, June 14-16, 2022, Revised Selected Papers (pp. 202-213)*. Cham: Springer Nature Switzerland. Available at: https://rephip.unr.edu.ar/xmlui/bitstream/handle/2133/24913/XVI%20International%20NooJ%20Conference%202022-Rosario%2C%20Argentina-Libro%20de%20abstracts.pdf?sequence=3#_page=37.
- Ilaria Veronesi, Ritamaria Bucciarelli, Francesco Saverio Tortoriello, Andrea Rodrigo, Marianna Greco, Colomba, Javier Julian Enriquez. The digital text workshop cloud, new solutions for super computing environments. 2023. The reason HAL ID: hal-03919524. Available at: <https://hal.science/hal-03919524>.

PUBLICATION

- Validation and implementation of quantum physics: the solution plan of Dante's rhetoric of Fano:⁴¹
⁴²¹<https://www.researchgate.net/publication/344626660> DPH Validation and implementation of quantum physics the Fano solving plan of Dantesque Rhetoric.



40

41

42 loquens all' homo smart: la contrattualistica del terzo millennio. di

- Larner, J. M. (2006). *Benjamin Britten and Luchino Visconti: Iterations of "Death in Venice" by Thomas Mann*. Florida State University:
<https://diginole.lib.fsu.edu/islandora/object/fsu:181600/datastream/PDF/view>.
- Planat, Michel and Metod Saniga. "On Pauli's charts of N-qudit." *arXiv preprint quant-ph/0701211* (2007): (<https://arxiv.org/pdf/quant-ph/0701211.pdf>).
- Weisstein, Eric W. "Fano Plane." From *MathWorld--A Wolfram Web*, (2007):

Summary Considerations :

Starting assumptions Communication in digital : Exploration of NLG languages :

Focus Type of input and type of output . Projects and Experiences (3)

1-Scientific model of reference : Musicological-quantitative and in-depth analysis-sound-tonal . Recursiveness and SA detection .

2- Relationship : number-group phrase concentration on finite groups and classes .

3-A trial of the transformation of literary text to digital text .

DRAFT FORECAST

Segment :2-Automatic digital tex

PROJECT: ... HOMO LABILIS- HOMO SMART TECHNOLOGIES AND NANOTECHNOLOGY

..... *loquens all'homo smart: la contrattualistica del terzo millennio.*

R. R. Poznansky⁴³

Notifications

Multiscalar brain adaptability in AI systems

<https://www.researchgate.net/messages/109621756>

Subject of study

Communicative process

Artificial general intelligence (AGI) represents generalized human cognitive abilities achieved by Turing computations in weak AI technology. Strong Artificial Intelligence (SAI) represents mental abilities, conscious processes, and subjective functioning achieved by nonTuring computations in yet unspecified technology. The difference between AGI and SAI is that the latter can understand uncertainty to predict an unexpected event, giving it enormous altitude for mind-like action needed for various applications.....

Éric André Poirier: dottorato di ricerca; Professore (Associato) all'Université du Québec à Trois-Rivières⁴⁴

<https://www.researchgate.net/messages/107049108>

<https://www.researchgate.net/messages/110423830>

Well it is very interesting. I know the work of NoaJ of Max Silberztein and I read his book regarding POS tagging ambiguities which I find very interesting. I am very interested with these subject areas and projects. I wish I could participate with a focus on translation quality assessment or volume of information comparisons between source and target segments. I would also like to develop linguistic tools with word embeddings.

⁴³ <https://mail.google.com/mail/u/1/?pli=1#inbox/FMfcgzGsltLlGmGCCkKJcHGcwJWRGqLCT>

⁴⁴ **Éric Poirier, professeur Traducteur agréé, directeur des programmes de traduction et directeur par intérim du Département- Langues modernes et traduction | Université du Québec à Trois-Rivière**

Research proposal

<https://mail.google.com/mail/u/0/#inbox/FMfcgzGsltTpnzmxwFsHrNNSzQILDnNz>

Dionéia Motta Monte-Serrat or Monte Serrat

<https://www.researchgate.net/messages/70162360>

<https://www.researchgate.net/messages/107575720>

The search continues..... and on behalf of the team ⁴⁵

6. PROJECT CONTINUATION - TOPOLOGY OF THE WORD⁴⁶

Research arc: Digital Transition HU-AI

This section integrates the final development of the 2020-2024 research path. The project moves from the scientific manifesto of digital transition opened by M. Planat and collaborators to the linguistic and technological formalization of the transition from alphabetic code to formal code. The expression "formal code" is used here in a broad sense: mathematical, quantum, computational, topological, lexical-grammatical, and automata-based codes.

6.1 Scientific premise: from Planat's manifesto to formal code transition

The reference model is the line of research represented by Graph Coverings for Investigating Non-Local Structures in Proteins, Music and Poems, where structural analogies among protein language, musical language, and poetic language are treated through graph coverings, finite groups, and non-local structures. In this work, Planat's model is understood as a scientific manifesto of digital transition: it shows how linguistic, musical, and symbolic structures can be reduced, compared, and transformed into formal and numerical structures.

Within this framework, the present research does not merely classify textual typologies. It observes the linguistic phenomenon in its process of transformation. The central problem is therefore not typology, but transition: how a text becomes measurable, how a linguistic unit becomes a formal object, and how recursive and phonotonal phenomena can be converted into data for computational treatment.

6.2 Object of observation: linguistic mechanisms as data-detection instruments

The research focuses on linguistic mechanisms observed as instruments for data detection and formal transformation. The observed domains are:

- structures: lexical, syntactic, phonotonal, recursive, and textual structures;
- mechanisms: substitution, transformation, inversion, pronominalization, recurrence, junctions, homophony, repetition, and reformulation;
- rhetoric: rhetorical configurations treated as formal operators capable of producing semantic, emotional, and computational effects.

These mechanisms are not treated as isolated rhetorical figures. They are treated as observable processes through which a literary text can be detected, measured, transformed, and prepared for digital modeling.

6.3 Test corpus: Dante Alighieri and recursive transition

The privileged test field is Dante Alighieri's Divine Comedy. The research begins from the literary text and observes phenomena of recursive transition: repetitions, phonotonal echoes, syntactic inversions, rhetorical

⁴⁵ Ritamaria Bucciarelli : https://www.researchgate.net/profile/Ritamaria-Bucciarelli?ev=hdr_xprf:

Linguista computazionale Language technologist NLG: Disciplines Computing in Social science, Arts and HumanitiesInterlinguisticsInformation ScienceSyntaxLiterary Theory
Skills and expertise

LearningLexicographySign LanguageTeaching and LearningCorporaVocabularyComputational Linguistics

⁴⁶

junctions, and recursive structures between verses, tercets, and cantos. The aim is to detect the formal conditions through which poetic language produces computable effects.

In this perspective, Dante is not used only as a literary example, but as a high-density laboratory of linguistic transformation. The text allows the observation of the transition from human literary communication to formalized and computationally readable structures.

6.4 Method: quantum calculation as detection instrument

The main instrument of detection is quantum calculation, already introduced in the previous research through the Fano plane, Fibonacci-guided phono-tonal analysis, and the comparison between numerical groups and phrase groups. Quantum calculation is used here not as a metaphor, but as a formal instrument for identifying relations, recurrences, equivalences, and transformations inside the text.

The procedure may be summarized as follows:

1. selection of a textual segment;
2. observation of linguistic mechanisms and recursive phenomena;
3. detection of structures through quantum and numerical models;
4. transfer of the observed phenomena into formal linguistic categories;
5. construction of local grammars, corpora, and computational environments for validation.

6.5 From quantum calculation to topology

The final intuition of the research is the movement from quantum calculation toward topology. Quantum calculation allows detection; topology allows the formal representation of relations, continuity, transformation, and non-locality within the linguistic space. The "Topology of the Word" therefore names the passage from measurable linguistic recursions to formal topological configurations.

In this sense, the word is no longer considered only as a lexical unit. It becomes a node, an operator, and a transformation point within a formal space. The text becomes a field of transitions, where phonotonal, syntactic, rhetorical, and semantic mechanisms can be represented as relations and paths.

6.6 New grammars and support technologies

The research leads to the hypothesis of new grammars for digital textual construction. These grammars are not limited to traditional description. They are intended as support technologies for:

- textual construction;
- textual interpretation;
- codification and decodification of linguistic structures;
- translation and reformulation;
- support for language disorders and inclusive education;
- human-AI collaboration in writing, reading, and interpretation.

The didactic and technological intuition is that a part of linguistic grammar must be explicitly dedicated to textual construction: how a text is built, how it is encoded, how it is decoded, and how artificial intelligence can support these processes without replacing the human interpretive act.

Notifications M. Planat research hypothesis: Reading - support - expert judgment

<https://www.researchgate.net/messages/inbox?page=30>

<https://www.researchgate.net/messages/149577474>

<https://www.researchgate.net/messages/147939678>

Analyse du sentiment et structures récursives — Proposition d'article conjoint — Ritamaria Bucciarelli

<https://www.researchgate.net/messages/147939678>

<https://www.researchgate.net/messages/147795480>

Final Acknowledgment to the Research Group

<https://www.researchgate.net/messages/147795480>

6.7 Research contribution

The contribution of this phase can be summarized in three points:

- it identifies linguistic mechanisms as instruments of data detection for digital transition;
 - it connects quantum calculation, recursive algebra, and topological modeling in the analysis of literary language;
 - it proposes the Topology of the Word as a bridge between human literary intelligence and artificial intelligence.
- The project therefore develops an arc of transformation: from Planat's scientific manifesto of digital transition, to the observation of linguistic mechanisms, to quantum detection, to topological modeling, and finally to formal automata and support technologies for textual production and interpretation.

6.8 Publications – The Topology of the Word (2023–2026)

The following publications constitute the primary scientific output of Project 6 – Topology of the Word, developed within the research arc 2023–2026 at the Venice Centre for Digital and Public Humanities (VeDPH), Università Ca' Foscari Venezia.

2026

Bucciarelli, R., Terrone, F., & Esposito, D. *What Does ChatGPT Have to Say About Topological Structure? The Anyon Hypothesis*. Venice: VeDPH – Ca' Foscari, 2026.

Bucciarelli, R., & Terrone, F. *L'Automa nello spazio intermedio. Liriche di Anna Senatore*. Ed. I.R.I.S., 2026.

2025

Bucciarelli, R. *Topological Structures of Language: Rhetoric and Symbolic Computation*. Venice: ARCA Ca' Foscari, 2025.

Bucciarelli, R. *Topologie della mente. Linguaggio, anyon e coscienza simbolica*. Venice: VeDPH – Ca' Foscari, 2025.

Bucciarelli, R. *Quantum Computation and Measurements from a Space-Time in Fixed Languages*. Venice: VeDPH – Ca' Foscari, 2025.

Bucciarelli, R., & Terrone, F. *Quantum Grammar and Symbolic AI: From Linguistic Recursion to $SU(2)_k$ Algebra*. Venice: VeDPH – Ca' Foscari, 2025.

Bucciarelli, R., Terrone, F., Rodrigo, A. F., & Enriquez, J. J. *Gödel's Legacy: Formal Thinking, LLM and the Evolution of Artificial Intelligence*. Venice: VeDPH – Ca' Foscari, 2025.

Bucciarelli, R., Terrone, F., & Enriquez, J. J. *Symbolic AI, Quantum Models and Text Automation: Toward Topologies of Language and Meaning*. Venice: VeDPH – Ca' Foscari, 2025.

2024

Bucciarelli, R., Veronesi, I., Tortoriello, F. S., Terrone, F., Rodrigo, A. F., Greco, M., et al. *The Digital Text Workshop Cloud2: New Solutions for Super Calculation Environments*. ISBN 978-88-99640-63-7, 2024.

Bucciarelli, R., Rodrigo, A. F., Enriquez, J. J., & Franceschini, S. *Rhetorical Analysis Techniques in Dante Alighieri's Divine Comedy. Apprendo con NooJ*. Venice: VeDPH, 2024.

Bucciarelli, R., Terrone, F., & Franceschini, S. *NooJ Digital Text Automation Workshop Artificial Intelligence (AI): Data Processing Automation and Cybersecurity Technologies*. Venice: VeDPH, 2024.

Terrone, F., Bucciarelli, R., Rodrigo, A. F., Enriquez, J. J., Tortoriello, F. S., & Veronesi, I. *Linguistic Resources for Automatic Natural Sign Language Generation*. Venice: VeDPH, 2024.

2023

Bucciarelli, R. *Machine Translation: Models, Technologies and Nanotechnologies*. Venice: VeDPH – Ca' Foscari, 2023.

Bucciarelli, R., Boschetti, F., Tortoriello, F. S., Veronesi, I., Enriquez, J. J., & Rodrigo, A. *Digital Intelligence: Models, Processes and Technologies*. Venice: VeDPH – Ca' Foscari, 2023.

6.9 Research Visibility and Independent Verification

As a further, independently verifiable evaluation element, the primary text of this research segment is openly deposited and freely consultable on the institutional repository of Ca' Foscari University of Venice:

https://iris.unive.it/retrieve/9dec653c-0995-49b2-9cfd-f35328a71500/ALGEBRA%20RICORSIVA.20_REV_21.05.27.pdf

The visibility of the work can also be independently checked through a general web search for its title, *What Does ChatGPT Have to Say About Topological Structure: The Anyon Hypothesis*, which returns the work positioned alongside the directly related studies by Michel Planat and Marcelo M. Amaral, including their own 2024 paper of closely related title — consistent with the explicit citation of Planat & Amaral (2024) already given in that work (see also Section 6.8 above).

A companion study within the same research arc, *Topologie della mente. Linguaggio, anyon e coscienza simbolica* (Topologies of the Mind. Language, Anyons, and Symbolic Consciousness), listed among the publications above, extends the same framework toward a reflection on symbolic consciousness and is available through the same institutional channels.

6.10 Current Publishing Phase (2026)

The research arc described in Section 6 is currently entering a new phase of publication, moving from the completed 2023-2026 output listed above toward a coordinated set of outputs still in preparation.

Springer monograph. A book-length monograph, *Quantum Topology of the Word: From Bach's Recursive Music to Recursive Automata*, co-authored with Marcelo M. Amaral, is in preparation for Springer, with Michel Planat serving as scientific referent. The volume brings together the musicological model grounded in Bach's recursive music, the philosophical model grounded in Gödel, the mathematical model grounded in Planat and Amaral's graph-covering and anyon-hypothesis framework, and the linguistic and automata-theoretic models developed through the Bucciarelli–Silvestri method, together with a chapter on the Fisher-Rao geometry extension and a chapter on AI grammars and technologies for teaching.

Gauge Freedom Journal (GFJ1). A paper extending the Fisher-Rao information-geometry curvature result to the linguistic domain (the “Amaral Extension”) is in preparation for submission to the Gauge Freedom Journal.

NooJ International Conference 2026. Two submission packages are in preparation for the NooJ International Conference 2026: “Topological Braiding of Linguistic Structures: Anyons, Recursion, and Symbolic Robustness in NooJ” (Bucciarelli, Rodrigo, Enriquez) and “NooJ as a Symbolic Interface: Recursive Grammars and Formal Linguistic Representation in Digital Humanities” (Bucciarelli, Terrone, Rodrigo, Enriquez).

Research profiles: ResearchGate – <https://www.researchgate.net/profile/Ritamaria-Bucciarelli> – ARCA Ca' Foscari: <https://iris.unive.it> – Academia.edu: <https://independent.academia.edu/RITAMARIABUCCIARELLI>

Ritamaria Bucciarelli

