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(editors)

**Tools, Methods, and Solutions
for the Exploration of Romanian Corpora**

INSTITUTUL EUROPEAN

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Roxana Patraş, Loredana Cuzmici
(editors)

TOOLS, METHODS, AND SOLUTIONS FOR THE EXPLORATION OF ROMANIAN CORPORA

INSTITUTUL EUROPEAN
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Postdigital Creativity: modeling poetry translation with multiplexes, neural networks, and large language models

Raluca TANASESCU
Chris TANASESCU

Introduction

This chapter presents an innovative computational translation approach within the Graph Poem (#GraphPoem) project (Tanasescu 2011), where natural language processing (NLP) and network graph theory intersect with poetry translation. Our project focuses on algorithmic-poetic and graph-theory methods, extending them into multilingual and computationally assembled anthologies, bridging English, French, and Romanian through network analysis, machine translation (MT), and translation by large language models (LLMs). The experiment presented in this chapter leverages existing poetry datasets, using computational approaches that model corpora as multiplexes, or multilayer networks, with poems as nodes and TF-IDF vectors for diction and enjambments as edges. In addition, by using complex analysis algorithms, we evaluate poem-nodes' betweenness centralities across languages and corpora, demonstrating the significance of underrepresented literatures (in this case, Belgian) within established anthologies of mainstream poetry.

More specifically, through automated corpus expansion and stylistic quantification, we integrate Belgian poetry into hegemonic datasets, highlighting its connective role and its impact on corpus diversity. Our study showcases an example of how poetry corpora can be computationally reshaped, repositioning poems within expanded datasets: by translating and modeling via translation across languages, we iteratively transform and interrelate poetry collections, leveraging NLP and network analysis approaches to dynamically reinterpret canonical anthologies, including the

well-known *Yale Anthology of Twentieth-Century French Poetry* (Caws 2008). In the process, we propose two novel concepts: “iterative corpus translation” and “translation modeling,” which encapsulate the dynamic, relational nature of our approach, where poems and algorithmic models continuously reshape and translate each other, blurring traditional distinctions between originals and translations and theorizing translation both as processual transformation and modeled product. In contemporary translation studies, numerous theoretical frameworks explore translation as a multifaceted phenomenon, often associating it with concepts such as creativity, experimentation, and political engagement. Our approach aligns to these views and expands them by emphasizing translation’s transformative processual capacity to generate novel outcomes and to critically engage with new modes and with highly dissimilar media.

This experiment challenges conventional notions of linguistic fidelity and equivalence by integrating code and algorithmic methodologies typically unexplored in poetry translation due to their perceived incapacity for achieving direct 1:1 correspondence between source and target texts. The perspective proposed in this chapter underscores not only the dynamic and innovative nature of translation as a mode of cultural and linguistic production but also the performative, intermedial, and political dimensions of computationally modeling poetry translation, elucidating how translation and modeling mutually inform and redefine each other within computationally assembled anthologies. Through this framework, we advance a new paradigm for poetry corpus curation, one that embraces digitality and intermediality to dynamically reconfigure and enrich poetic collections across languages and cultures and to enhance our understanding of translation as both an artform and a technologically mediated process in the postdigital age.

Models in Translation Studies

Translation Studies has long been operating on the grounds of three prominent theoretical models to understand and analyze the product and process of translation (Chesterman 2000). A first such model has been the *communicative* one, which views translation as a means of transmitting a message from one language to another while

considering the communicative purpose and target audience of the translated text. Thus, the focus is on achieving equivalence in communicative effect rather than adhering strictly to linguistic form. The second prominent model was the one promoted by the proponents of *Skopos Theory*: introduced by Hans Vermeer (1996), it proposes that the purpose (Skopos) of a translation determines the translation strategy and methods used, with the translator's primary goal to fulfill the specific communicative function or purpose of the translated text within a particular context. This model shifts the focus from linguistic equivalence to functional adequacy, where the success of a translation is measured by its effectiveness in achieving the envisaged communicative goal. Finally, the *Descriptive Translation Studies* (DTS) Model has been operational since the mid 1990s and considered by many scholars as underlying most of the more recent propositions. Developed by scholars like Gideon Toury (1995), DTS focuses on observing and analyzing translation practices as they occur empirically. DTS examines translations in real-world contexts, considering factors such as cultural norms, societal influences, and the behavior of translators and translation agents, with the aim to describe and explain translation phenomena based on observable data rather than on normative principles.

The DTS model challenges, indeed, traditional hierarchical relationships between theory and practice in the study of translation as it advocates for an empirical approach that emphasizes observing and analyzing translation practices in real-world contexts rather than prescribing normative theories or rules. It posits a feedback loop between theory and practice, where theoretical insights are developed and refined based on empirical observations of translation activities, and these theories, in turn, inform further analysis of translation phenomena. This iterative process does foster a dynamic understanding of translation processes, grounded in empirical evidence and responsive to the complexities of multilayered translation contexts. It also does encourage an interdisciplinary and (partially, sic!) holistic approach, rejecting strict hierarchies between different strands of translation studies and promoting a comprehensive study of translation that integrates linguistic, cultural, and sociological dimensions. However, in spite of the considerable opening this model has offered to the discipline of translation, it has been rightfully argued that it very much keeps translation in the realm of language and does not do justice to other

forms of translation, such as the intersemiotic (the process of translating or converting a text or message from one sign system to another) and interepistemic ones (the process of translating or transferring knowledge, concepts, or information from one epistemic framework or domain to another) (Marais 2014, Bennett 2024). In addition, we suggest, it preserves a form of purification, which “creates two distinct ontological zones: that of human beings on the one hand; that of nonhumans on the other” (Latour 1993, 10–11) and entertains the human vs. technology dichotomy, which has been particularly pervasive in literary translation.

The realization that literary translation cannot concern only language has elicited lots of scholarly work over the past five years, with at least as many recent academic books dedicated to translation, creativity and experimentation (Robinson 2022; Lee 2022; Lukes 2023; Grass 2023; Robert-Foley 2024). These books come after another series of contributions that examined translation beyond linguistic transfer, such as *Translation and Creativity. Perspectives on Creative Writing and Translation Studies* (Loffredo and Perteghella 2006), *Translation and Creativity* (Malmkjær 2019) and *Translation and Multimodality: Beyond Words* (Boria *et al.* 2020), to name but a few. In *The Experimental Translator* (2022), Douglas Robinson celebrates experimental translation through various personas: the hypercyborg translator, collage translator, smuggler translator, and heteronymous translator. He explores translation as a literary act of creativity, emphasizing its departure from binary and predetermined truths. Robinson’s experimental translator engages in literary creativity, inviting readers to explore the rich possibilities of experimental texts. His work does not seek resolution in the heterotopias explored but revels in the diversity and complexity of experimental translation. Tong King Lee’s *Translation as Experimentalism: Exploring Play in Poetics* (2022) introduces experiential translation, emphasizing memes over signs to add value to the original through verbal and nonverbal resources. Lee’s ludic translational approach democratizes languages, transforming translation into a performative and dialogic space. He applies his theory to Chinese experimental concrete poetics, using visual, random, and chaotic translations that convey meaning through all sensoria. Lee theorizes through exemplification, highlighting the open, plural, and non-definitive nature of ludic translations. His work redefines translation as a creative, dynamic process that defies

traditional boundaries and invites constant reinterpretation. Alexandra Lukes, editor of *Translating the Avant-Garde, Avant-Garde Translation* (2023), curated a volume that challenges conventional concepts of translation. Contributors destabilize the idea of authorship and the very notion of translation, showcasing the latter as a dynamic, creative and, above all, playful process. The book features contributions from prominent translators like Clive Scott and the above-mentioned Douglas Robinson, exploring experimental and avant-garde literary translation. The volume also examines translation's role in contemporary art, reflecting on connections with figures like Brazilian poet Haroldo de Campos and underscores its potential to blur boundaries between theory and practice, opening up new avenues for literary translation as “an exploratory playground for radical transformation.” (2023, book blurb)

Two of these recent contributions stand out in relation to the work presented in this chapter. Delphine Grass' book *Translation as Creative-Critical Practice* (2023) explores translation as a poetic and political task, advocating for an experimental and bodily approach. Grass too integrates theory and practice, emphasizing openness, variation, and a diverse range of cultural, physical, and emotional impulses. She incorporates the concept of “autotheory,” and blends theory and philosophy with autobiography and the body, transforming translation into a sensorial, tactile task. Grass examines performative translations, such as Anne Carson's work, highlighting gaps and silences on the page to invite further translations. Her work not only challenges traditional notions of translation in obvious ways, but also emphasizes the transformative potential of personal experience and poetry translators' capacity to reflect critically on their own work. Translation as a critical and creative practice is one of the very stakes of MARGENTO's work in translation (Tanasescu 2024c) as is the intermediality of the translation act in this day and age. While for Grass intermediality is manifest in the dynamic relationship between sound, body and page, for MARGENTO poetry translation cannot ignore digitality: as we will see, poems are words but also code, algorithms, and nodes in networks of language.

The second book that is relevant to the translation experiment proposed in this chapter is Lily Robert-Foley's *Experimental Translation: The Work of Translation in the Age of Algorithmic Production* (2024) which investigates translation within

the context of Artificial Intelligence (AI) and procedural generation and thus addresses the human vs. technology binarism in translation. She analyses collaborative activist translations addressing significant topics such as the Holocaust, migration, and colonialism and she critiques conventional translation norms, advocating for experimental translation that challenges entrenched rules and norms in language and culture. Her work highlights translation as a politically transformative act, disrupting marketplace norms through innovative approaches. Just like photography transformed artistic approaches by questioning the pursuit of absolute realism, she argues, machine translation has paradoxically empowered human translators to depart from rigid fidelity, granting them the freedom to introduce errors, depart from the original text, and creatively manipulate it. This blurring of lines between creation and imitation merges elements of cyborg collage and appropriation. The seven chapters on which the book is built reimagine seven traditional “methods” of translation theory and education (especially in Francophone context)—borrowing, calque, literal translation, transposition, modulation, equivalence, and adaptation—by modernizing them to tackle the material, political, and poetic issues of our current era. Robert-Foley’s exploration reveals thus translation’s potential to subvert and interrogate dominant practices in the (post)digital age.

The intersection of translation, creativity, and computability presents a compelling area of inquiry within contemporary humanities scholarship more broadly. As a creative act of mediation between languages and cultures, translation involves intricate processes of interpretation, adaptation, and expression. When viewed through the lens of computability, translation takes on new dimensions, as algorithms and machine learning models are employed to automate and optimize translation tasks. While traditional views emphasize the role of human intuition, cultural sensitivity, and linguistic dexterity in translation creativity, computational approaches introduce novel perspectives by exploring the potential for automated systems to generate translations that are not only accurate but also contextually nuanced and stylistically appropriate. Scholars are increasingly exploring the interplay between human creativity and computational techniques in translation, examining how computational tools can enhance, supplement, or even challenge

traditional notions of translator creativity. This inquiry has started only recently to extend beyond the realm of machine translation to encompass broader questions about the impact of technology on linguistic and cultural expression, as well as the evolving roles of translators in an increasingly digital and interconnected world. However, scholarship is still in its infancy with regard to the modes and modalities that digitality brings about in translation; instead, it seems to stubbornly insist on notions like “norms,” “accuracy,” and “fitness” in the field of machine translation (Guerberof-Arenas and Toral 2024) and on the limited possibilities of Computer Assisted Literary Translation (CALT) (Hadley *et al.* 2022). In spite of the development of reliable neural machine translation systems that can handle complex sentences, translating poetry remains a challenge due to issues of stylistics, and although the emergence of Large Language Models (LLMs) like Chat GPT has opened up new possibilities for poetry translation research, current scholarship only entertains a narrative of enhancement and support for literary translators, preserving the need for postediting and never touching on the performative dimension this chapter discusses.

Translation, Code, and Computational Complexity

Code has only extremely recently and sparingly become an issue of interest in Translation Studies theory. The relationship between the operation of translation and computer code reveals a fascinating and multifaceted relationship rooted in the fact that, at its core, translating human-readable code into machine-executable instructions is a form of interpretation. Just like translators bridge the gap between natural languages, programmers rely on compilers and interpreters to translate their code’s intent into instructions the computer can understand. Similar to cross-linguistic translation, code can be translated from one programming language to another for reasons like platform compatibility, performance optimization, or programmer preference, a process which necessitates understanding and transforming code across different abstraction levels, from high-level languages like Python to the low-level world of machine code, for instance. Each layer requires distinct translation techniques and considerations. Moreover, the operation of

translation goes beyond simple syntactic conversion. It often involves debugging and optimization, akin to refining a natural language translation for clarity and efficiency. While automated translation tools exist for both code and natural languages, human interpretation remains essential. Humans provide the context, understanding, and creativity that these tools might lack, although human interpretation and contextualization are currently inevitably modeled by the engulfing “algorithmic culture” of the posthuman. Ultimately, the connection between translation and computer code highlights the fundamental parallels between human (or the so-called natural) language and programming languages, as both involve conveying meaning, comprehending context, and ensuring accuracy, albeit in distinct contexts and with unique objectives.

In spite of these potentials, it was only very recently that the broader field of translation studies has reflected on the role played by computer code translation on its object of research outside machine translation. In 2023, James St. André departed from the metaphor of *brain as a computer* to draw on several notable resemblances between natural language and computer languages. Similar to the former, the latter employs discrete symbols analogous to words, with categories and grammatical elements like “for” and “while,” alongside synonyms and antonyms. In addition, syntax rules dictate the significance of element order, akin to natural language’s structural principles. This resemblance extends to Saussure’s concepts of *langue* and *parole*, where computer languages, like natural ones, generate infinite expressions and allow mixing. Just as natural languages evolve, diversify, and occasionally become obsolete, computer languages follow a similar trajectory, challenging theories such as Chomsky’s deep structure model. The rapid proliferation of computer languages underscores the intrinsic diversity and change present in both human intelligence and software, necessitating ongoing translation efforts. This diversity, contrasting with slow natural language development, presents a challenge to standardization efforts. Nonetheless, the well-documented history of computer languages offers valuable insights into their evolution. St. André also discusses the most consequential differences between the two types of language. One significant difference between natural languages and computer languages lies in the function of comments within the code. Comments, serving as a form of metalanguage or

annotation, are embedded within the program to provide information to programmers but are entirely disregarded by the computer during code execution. Unlike in natural languages, where redundancy allows for error tolerance while maintaining communication possibilities, errors in computer code lead to complete breakdowns in communication. If an error occurs, the program either fails to execute entirely, resulting in no output and hence no discernible meaning, or produces nonsensical output, such as in cases of infinite loops causing program hang-ups. Moreover, computer languages lack the capacity to express counterfactuals; any attempt to do so yields a Boolean value of FALSE, rendering deceit impossible within the realm of computer programming. Additionally, the absence of “maybe” or true randomness in computer languages contrasts starkly with the nuances of natural language. Even what are termed as random number generators in computers are in fact complex calculations attempting to simulate randomness based on predetermined kernels or on complex system modeling, such as logistic maps. Furthermore, contextual understanding in computer programming is confined to the current state of variables, which operates deterministically, in contrast to the multifaceted, context-dependent nature of societal values inherent in natural languages. These distinctions culminate in computer languages constructing rigid, highly logical, binary structures that offer either absolute certainty or nothing at all, although currently scholarship, we suggest, strives to model probability and compute indeterminacy, uncertainty, or ambiguity (see the “Hermeneutic Modeling” section in Tanasescu 2024c, particularly the contributions by Jan-Erik Stange and Florentina Armaselu).

Given that computer languages embody rigid, highly logical, binary structures promising absolute certainty, and considering the potential for precise equivalence among them, one might anticipate that translating between computer languages would be straightforward, notes St André. However, translating between computer languages is a highly difficult task because computer programmes are complex systems demonstrating emergent properties—new and coherent structures, patterns, and attributes during the self-organization process within complex systems. Given that different computer languages inherently possess distinct emergent properties arising from the entirety of the system they are part of, any automated translation system is likely to falter. This is because automated translation programs operate at

the micro level of text—words, phrases, or at most, sentences—whereas emergent properties “are neither predictable from, deducible from, nor reducible to the parts alone.” (Goldstein 1999: 57) Three obvious conclusions are drawn: first, the fact that the resistance of rigid and strictly logical computer languages to machine translation raises doubts about Chomsky’s deep structure theory’s practicality in translation applications; second, that complexity theory holds potential for enhancing the study of natural language translation, particularly regarding large-scale textual features; and, third, that conceptualizing computer languages as both languages and translations could have intriguing implications for the theoretical understanding of translation as interpretation, aligning with perspectives advocated by scholars such as George Steiner (1992), who argued that translation is not merely a mechanical process of transferring words from one language to another, but rather an act of interpretation and re-creation, informed by translators’ own cultural, linguistic, and personal perspectives, which inevitably makes every translation an interpretation of the original text. While St. André moves on quite quickly to suggest other possible avenues of research related to commercial and non-commercial translation and to a possible yet curious return to William Frawley’s simple definition of translation as an operation based on “how, why, when, where [...] coded elements are rendered into other codes” (1984, 164), we would like to explore in more depth the implications of computational complexity on creativity in translation.

It is obvious that computational complexity is different from the linguistic and cultural complexities that inform traditional literary translation in many ways: translators face choices about how to convey not only the literal meaning of the words, but also the nuances, connotations, and cultural references embedded in the text. In doing so, they inevitably shape the meaning of the original work according to their own understanding and interpretation which in turn reflects on the subjective and creative nature of the translation process. But there is at least one way in which one can easily liken computational complexity to literary translation: computational complexity in algorithms mirrors the intricate linguistic structures and cultural nuances that translators navigate when rendering a text into another language. Just as algorithms grapple with processing vast amounts of data and making optimal decisions within constrained resources, translators confront the challenge of preserving meaning,

tone, poetic form and cultural context while adapting texts across linguistic boundaries. Both computational complexity and literary translation require managing ambiguity, making trade-offs, and creatively navigating constraints to achieve the desired outcomes.

The computational complexity behind LLMs piqued our scholarly and poetic curiosity and invited an experiment in which we compared the potential of neural networks (NNs) and LLMs to handle poetry translation in general and enjambment in particular—a poetic technique where a sentence or phrase continues from one line of verse to the next without a pause or a syntactical break. From a technical point of view, this experiment tests the capabilities behind the two models in relation to their handling of poetic diction and style and seeks to leverage the AI’s potential for cross-linguistic analysis and its effectiveness and speed in handling large amounts of data. From a broader perspective, the experiment leverages the iterative capabilities of the two translation models and their potential role in destabilizing steadfast poetic canons. Ultimately, it also seeks to test the creative possibilities entailed by the interaction between translators and various open-source AI Chatbots, thus blurring the lines not only between original and translation but also between humans and technology, canonical authors and underdogs, and so on.

The Technics. Models, Outputs, and their Comparative Criticism

The technical side of this project is part of a triadic constellation of simultaneous initiatives unfurling along different timelines, at different paces, and within imbricated yet not fully identical theoretical frameworks. They have been developed inside the overarching galaxy of the *Graph Poem* (#GraphPoem) that, over the course of almost fifteen years (since 2010), applied natural language processing (NLP) and (network) graph theory in poetry by developing computational classifiers (e.g., Kesarwani *et al.* 2021; Tanasescu *et al.* 2018; Kesarwani *et al.* 2017, Lou *et al.* 2015) alongside network models and deploying them in scholarly work (Tanasescu and Tanasescu 2023), intermedia performance (Tanasescu 2022, Tanasescu *et al.* 2020), and anthology editing (MARGENTO 2018, MARGENTO 2024).

The above-mentioned three-pronged development includes, first, studying and articulating (community/network-based) dynamical systems as models of and for #GraphPoem events and performances (Tanasescu 2024a). Second, it involves the application of complex system and intermediality models in computationally assembling poetry anthologies that reposition underrepresented or minoritized literatures within hegemonic contexts (Belgian poetry specifically into established Francophone and English-translation corpora, Tanasescu 2024b). And, last but not least, it involves the current endeavor, detailing the algorithmic-poetic and graph-theory methods and models of the above and extrapolating them into further multilingual assemblages—English, French, and Romanian—and multilingual(ly) computationally assembled anthologies in (human plus/as) MT and LLM environments.

In doing so, the data was partly identical with the ones used for the second project in the above-mentioned constellation—the forthcoming *Computationally Assembled Anthology of Contemporary Belgian Poetry* (MARGENTO 2024a). This anthology involves methods for selecting poems from an emerging corpus of Belgian poetry that occupy relevant positions in the expanded corpora resulting from adding them to existing established datasets. As twice marginalized—both in French and English-translation settings—Belgian poetry can nevertheless prove relevant when analyzed for stylistic features that are generally important in modern and contemporary poetry and significantly (and/or intriguingly) realized in more widely circulated datasets.

The current project took over the above-mentioned anthology in guise of the contents of the modern and contemporary poetry sections of the *Yale Anthology of Twentieth-Century French Poetry* (Caws 2008, in which the only featured Belgian is Guy Goffette, but was he [really] [perceived to be] Belgian?), which came with both originals and English translations done by established poets/translators and/or French poetry connoisseurs such as John Ashbery, Marilyn Hacker, Cole Swensen, Stacy Doris, or the editor herself, Mary Ann Caws. Alongside those sets, it imported part of the injected Belgian corpus as featured in the forthcoming anthology (MARGENTO 2024a), but replaced its English human translation (mostly done by John Taylor) with

translations done by LLMs—e.g., Chat GPT and Bard (meanwhile Gemini).¹ It also complemented those data with Romanian ones, obtained by using DeepL for translating the French and English poems in the *Yale Anthology* and, once again, Chat GPT to translate our Belgian corpus.

In terms of algorithms and computational approaches developed for the project at hand, we decided to model the corpora as multiplexes—multilayer networks in which the nodes are the same in all layers. The nodes in these multiplexes are the poems and the edges quantify similarities between the quantification of the feature a specific layer represents. The features we settled for are poetic diction—represented as TF-IDF vectors²—and enjambments, quantified in a manner we will describe in a bit. To the best of our knowledge, enjambment has not been computationally tackled before in any of the languages under discussion or any other (with the notable exception of a singular Spanish sonnet analysis project, Ruiz Fabo *et al.* 2017). After assembling the multiplexes, we calculated the betweenness centralities of all poem-nodes involved and evaluated the behavior of the Belgian poems in each language and corpus separately as well as across all languages and in all the corpora combined. The main point of such method is not only to show, by

¹ Gemini actually ended by not being included in the project. While chatting with the second author of this chapter on April 2nd 2024, Gemini wrote (after translating a few poems in our corpus from French into English and Romanian): “*Je suis une IA basée sur du texte, je ne peux donc pas vous aider avec cette demande.*” (3) “*Je ne peux pas vous aider, car je ne suis qu’un modèle de langage et je n’ai pas les compétences pour traiter et comprendre votre demande.*” (2) “*Je suis conçu uniquement pour traiter et générer du texte, je ne peux donc pas vous aider avec cette demande.*” (3) “You’re welcome! Glad I could help in some way. If you have any other questions that don’t involve translation, feel free to ask!”

² TF-IDF (Term Frequency-Inverse Document Frequency) vectors are numerical representations used to encode text documents for machine learning and information retrieval purposes. The TF component measures the frequency of each term (word) within a document, indicating how often a word appears relative to the total number of words in that document. The IDF component assesses the significance of a term across a corpus of documents by calculating the logarithm of the total number of documents divided by the number of documents containing the term. Terms that appear frequently across many documents receive a lower IDF value, while terms appearing in fewer documents have a higher IDF value, signifying their uniqueness or importance. The TF-IDF vector represents each document as a vector of numerical values, where each value corresponds to the TF-IDF score of a specific term in the document. This vectorization method captures the relevance of terms within individual documents and across the entire corpus, enabling efficient processing and analysis of textual data in natural language processing tasks like text classification, clustering, and similarity measurement.

means of quantification, that underrepresented literatures and/or languages can rank significantly high when compared to or submerged into existing exclusive or hegemonic corpora, but can also act as strong connectors within the latter, thus contributing both diversity and cohesion to established collections, anthologies, archives, and/or hierarchies. Far from an attempt to fit in or even fill a subservient position, the approach implicates quite on the contrary reassessing the established or “canonical” corpora on its own terms and revisiting them in a subversive and/or intermedial-performative way that dynamically assemble and expand traversal and transgressive communities of/as corpora and computation. At the same time, another objective has been to experimentally involve AI, particularly in the sense of MT and, more substantively, LLMs, in such projects, and assess them in the process both comparatively as well as within (post)human or human-computer-interaction (HCI) settings.³

As part of #GraphPoem, a host of stylistic features have been developed computational detectors and classifiers for—from meter (Tanasescu *et al.* 2016) to diction to rhyme (Kesarwani *et al.* 2021) to metaphor (Tanasescu *et al.* 2018), etc. However, in dealing with prevailingly modern and contemporary corpora, we had to be more selective as to which of these or other features needed to be computationally analyzed as data-relevant. For the first computationally assembled anthology (MARGENTO 2018), we thus chose to use only diction-related criteria, representing the corpora as plain (single-layer network) graphs of poem-nodes and edges quantifying the similarity between their TF-IDF vectors. One of the key procedures implicated by computationally assembling poetry anthologies as we coined and detailed the term and concept was automated corpus expansion. Our diction classifier was deployed to track down suspects that would act in a remarkable idiosyncratic way when added to the growing corpus: they would be evidently marginal in terms of similarity (technically speaking, having low closeness centralities in the network)

³ In a recent contribution (Tanasescu 2022), we advanced the alternative term human-computer-intra-action for the widely used acronym HCI drawing on anti-essentialist contributions, particularly the intermediality-informed philosophy of Larrue and Vitali-Rosati (2018) as well as our own computational-performative vision on human/AI, community/networks, and data as operationally imbricated and, therefore, ontologically co-formative (Tanasescu *et al.* 2020).

but would nevertheless act as outstandingly strong connectors (highest betweenness centrality).

As hinted above, such algorithms both dismantled dominant politics and performed new communities informed by newly shared or serendipitously-computationally unearthed principles. Moreover, culturally and historically specific data prompted new features to computationally tackle which in turn required more complex mathematical models. The vehicle of rhythm is not so much (or not only) traditional meter in contemporary poetry as it is (also, when not mostly) syntactic sequencing and sonic cadences. Line breaks consequently acquire an ever more pronounced rhythmical function to the extent to which enjambments emerge as a major when not *the* contemporary-verse-informing rhythmical device (see for instance Leithauser 2022). Processing enjambments alongside diction then required using a multilayer-network model, in our case, as mentioned, the multiplex, and then implementing the related complex analysis algorithms.

In developing enjambment quantifiers for all three languages at hand, we deployed the spaCy news-corpora pretrained models for each language (the largest models available) and used them in parsing the poems/translations for part-of-speech (POS) tagging and syntactic dependencies (*Figure 1*). We roughly followed James Longenbach's theory and classification of enjambments (Longenbach 2007) which we adapted to each language and also used in articulating our own hierarchy and corresponding tiered scoring. The parser thus graded enjambments in descending order from those occurring after conjugated forms of the verb "to be" or auxiliaries to those between subject and verb or within phrasal verbs in English and verb expressions in French and Romanian to those breaking up more complex structures and ultimately cutting verbs from their subjects or objects already interspersed with other words or particles to those dividing nominal phrases to, last but not least, those separating coordinated or subordinated phrases or clauses. Besides tracking down such specific syntactic patterns we also parsed verb subtrees to make sure entire sentences or longer syntactic blocks are combed for any other possible significant line break. The resulting specific scores of all enjambments were then summed up and normalized, i.e., divided by the number of lines in the poem which outputted the latter's own score.

The next step involved representing the data as multiplexes (*see the GitHub repo, MARGENTO 2024b*). We first created a multiplex for each language, that is, one network representing the French originals in the *Yale Anthology* alongside the Belgian originals, another for the English translations in said anthology alongside the Belgian poems translated into English by ChatGPT, and the last one for the Romanian DeepL translations of the poems in the anthology and the ChatGPT translations of the Belgian poems into Romanian. The two layers of these multiplexes represented enjambments in the poems in each language quantified as described above and the correlations between these scores across the corpus, and similarities between the TF-IDF vectors, respectively. The latter not only represented a way of quantifying and interrelating the vocabulary of the poems in the corpora, but also measured the extent to which the poems (Belgian originals or their translations) involved in expanding the corpus could play a connective role in terms of the language and the words per se appearing in each and all poems in the resulting assemblage.

If based on betweenness centrality ranking, one were to select from the resulting enlarged corpus (containing all poems in the *Yale Anthology* and the added Belgian ones) the same number of poems as that of the ones in the former—in other words, if one were to redo the Yale selection based on the stylistic quantification of the poems in a more inclusive dataset—in the original French there will be 22 new poems making the cut, that is, 75% of the added corpus and almost 32% of the resulting selection (compared to 2.89% of the actual sections in the published Yale collection). 21 poems would make the cut in English translation and 20 in Romanian (*see the GitHub repo, MARGENTO 2024b*).

There are no less than 18 poems that made the cut in all three languages (so basically, 54 poems made it into the trilingual 207 top tier within a 294-poem corpus represented as three 196-node multiplexes), which shows remarkable consistency in terms of the stylistic features we have quantified between the original and the translations, and, moreover, with respect to the initial corpus in the *Yale Anthology*. This is not as easy an output to explain as it may seem at first glance though, particularly given that the English and Romanian translations of the poems in the anthology were not done by the same translator that translated the Belgian additions.

In English, for instance, the translations done by ChatGPT of the Belgian poems were added to the English translations in the anthology *per se*. As a result though, the LLM’s English renditions proved remarkably consistent with the originals in terms of gross statistics, missing only one of the Belgian poems that made the cut in French.

The AI model’s Romanian translations, on the other hand, reinforced the trend in both the original and in the poems that made the cut in all three languages (the 18 poems mentioned above, *i.e.*, 54 in all languages): a preponderance of under-represented voices in general and of women poets in particular. 11 out of the 18 poems that entered our “imaginary” collection in all three languages are poems written by women (and 14 of the 23 in the three languages combined); and while, on top of these, two of those that made it in French but not in Romanian are by Anne Versailles and Christine Avenin, respectively, the Romanian translations enhanced that direction nevertheless by bringing to the table a remarkable poem (and poet) that had not made the cut in French: “Ici” by Corinne Hoex (part I, in our structuring of the data, see the GitHub repo). While serendipitously of the same “mind” in what concerns the poetics informing our approach, ChatGPT also seemed to tackle the assignment—in both English and Romanian—with a context-and-corpus-aware method. We did ask the LLM whether it was indeed aware of the *Yale Anthology* and its contents, and its response was quite politic. It knew *of* it but in its capacity as “AI language model” it did not have access “to information about the specific contents of my training data,” while being nevertheless “familiar with a wide range of poetry and literary works, including those by many French poets featured in such anthologies...” (ChatGPT 2024)

Our next experiment was then to create a graph of the poems in all three languages, hence a 6-layered network with 2 layers (tf-idf and enjambment similarities) per language, conventionally considering poems and their translations to be the same topological entities, and thus obtaining a 588-node multiplex. The behaviour of the 3 monolingual sets (and multiplexes) separately and that of the trilingual set (and overall network) are in this particular case similar in certain respects and different in significant others. There are 23 titles that made the cut in the trilingual multiplex which is also the sum of all titles in the three languages developed separately, which may lead to the wrong conclusion that in terms of

numbers the two models behave very similarly. This represents nevertheless a manner of speaking when it comes to the trilingual model, conventionally considering a poem to be the same as its translations, when, in reality, we have 69 poems in French, English, and Romanian ranking among the first 3 x 69 (207) of the 3 x 98 (294) total in all three languages combined. For the single-language models, the 23 total cannot be multiplied by 3 though. Of these 23, as stated above, only 18 make the cut across the languages modeled separately, therefore, only 54 (compared to the 69 in the trilingual model) will rank on top of the 294 in all three languages. In spite of the relatively small sizes of the corpora under discussion, the advantage of complexity and multilingualism is obvious in this case when we compare the two models, a point we made in other recent related publications with regards to community-based resistance (in interplatform intermediality and data-commoning, Tanasescu 2024a) and empowering minorities and minoritized poetries (Tanasescu 2024b).

In terms of specific differences, the one-language-at-a-time model managed to insert among the top-ranking titles five that the trilingual did not: “Vive la Bauté” by Laurence Vielle, “Brux’elle” by Anne Versaille, “Desincarceration” by Charline Lambert, and “Le P Respectueux” and “Le Coiffeur,” both by Jan Baetens, listed here with their original titles while they actually made the cut in each of the three languages (see again the paper’s GitHub). These poems are united by an ambiguity and/or political ambivalence in representing femininity that ranges from the discriminating and commodifyingly normative in the first one to the social/sexual/work-related in the second—as well as in Baetens’s both poems—to the medical-physiological in Lambert’s “Desincarceration.” On the other hand, the trilingual model’s specific contribution consists of “Ici” (part II) by Corinne Hoex, “1998” by Lisette Lombé, “Mains Ouvertes” (parts I and II) by Philippe Mathy, and “Promener Un Feu” by Carl Norac. A rich and nuanced stylistic and thematic spectrum therefore ranging from Hoex’s delicate, catalog-like, yet intransigently materialist take on the established histories of the spiritual, the incisive performative assertion of the underrepresented or discriminated in Lombé to the alluringly self-contradictory, both pregnant and airy, erotic and nature-contemplating lyricism of Mathy to Norac’s ironically sentimental and matter-of-fact philosophical allegories.

These two trends are fused in the 18 titles (translating to 54 poems in the three languages) that are shared by both models as ranking high in the enlarged corpora, with a further stress on the feminine, the underrepresented, and the political, as complemented by the erotically intense or contemplative. Both poems by Aventin are in there, for instance, alongside those of Véronique Bergen and Gioia Kayaga, and so are Hoex and Lambert's poems in the Belgian corpus that did not appear in each model's specific lists above (see MARGENTO 2024B). Savitzkaya's profane and infectious eroticism alongside Namur's quintessential music and Logist's heartfelt, inconsolate paradoxes complete that large, diverse, and commanding ensemble.

Poetics of the Technics. In Guise of a Conclusion

We think of anthology editing as a computational way of revisiting and redeveloping poetry corpora and their contents. For our first experiment, for instance, we constructed three multiplexes, one for each language, the first comprising the originals, the second the English translations by “humans” in the *Yale Anthology* alongside ChatGPT's translations into English of the Belgian corpus, and the third the DeepL translations into Romanian of the French poems in the anthology alongside ChatGPT's Romanian translations of the Belgian corpus. In this case, our resulting “imaginary” anthology would first include the Belgian poems that made the cut in all three languages and would therefore be featured as such, in French alongside English and Romanian translations. Then it would include the ones that made it only in French—and those one would be featured in French only—and, last but not least, the one poem that made it in Romanian alone, featured as such, only in Romanian.

This involves not only reshuffling the contents of the *Yale Anthology* and replacing a significant number of poems with Belgian ones, but also two more important steps: first, assessing the stylistic prominence of poems in different languages and, where a certain language made a significant contribution, featuring the poem as such (specifically in that language) in the selection (featuring, as it were, the... original translation); and, second, rewriting the initial corpus itself.

On the one hand, given the computational processing and the Mathematical model, the poems are reread and rewritten as networked agents: their presence in the multiplex creates new (inter/intra)relational versions of all the other poems (by changing their tf-idf vectors for instance, or their topological location in the resulting complex network) which, in their turn, read and rewrite the poems that triggered such an evolution. Translations of the newly added Belgian poems thus make their way into an expanding more inclusive corpus while new translations of some of the poems in the initial one replace those initially featured (in, e.g., the *Yale Anthology*) and/or complement them with other translations, into the same and other languages. On the other hand, the larger project this came as a development of, involved translation as rewriting and/or rearranging poems in the initial and overall corpora. For the Belgian anthology (an anthology of possible anthologies, as described in a theoretical section of the forthcoming collection, Tanasescu 2024b), some of the poems in the *Yale Anthology* (particularly in the most recent-period section) since prose poems were rearranged into verse with a sharp eye on possible enjambments to crop up in the process as arguably both consistent with and enhancing of the piece's as well as the corpus' semantic and aesthetic potential. These experiments were once in a while conducted in collaboration with ChatGPT and other LLMs and while mainly dealing with prose poems, it also now and then involved poems in verse in both the Yale and the Belgian corpora (MARGENTO 2024). Such experiments are currently under way in the trilingual corpora too and will constitute the focus of future publications.

There are two concepts we want to advance here based on the technological poetics informing the project (and related projects) and the attendant computational experiments and outputs. The first of them is *iterative corpus translation*. The poetry corpora involved and created (in and by translation) translate, reshuffle, interpenetrate each other and intermingle by means of NLP and network assemblage and analysis. Poems are translated within, across, and as corpora into the same and other (natural and computational) languages and forms iteratively and the output is itself relational, emergent, dynamic, inter/multilingual, in (potentially) continuous motion and change, and further translatable (or dissolvable) into ever wider contexts and environments. This modeling of translation aligns with the non-linear, rhizomatic, performative, and ludic dimension that has become so attractive in the contemporary

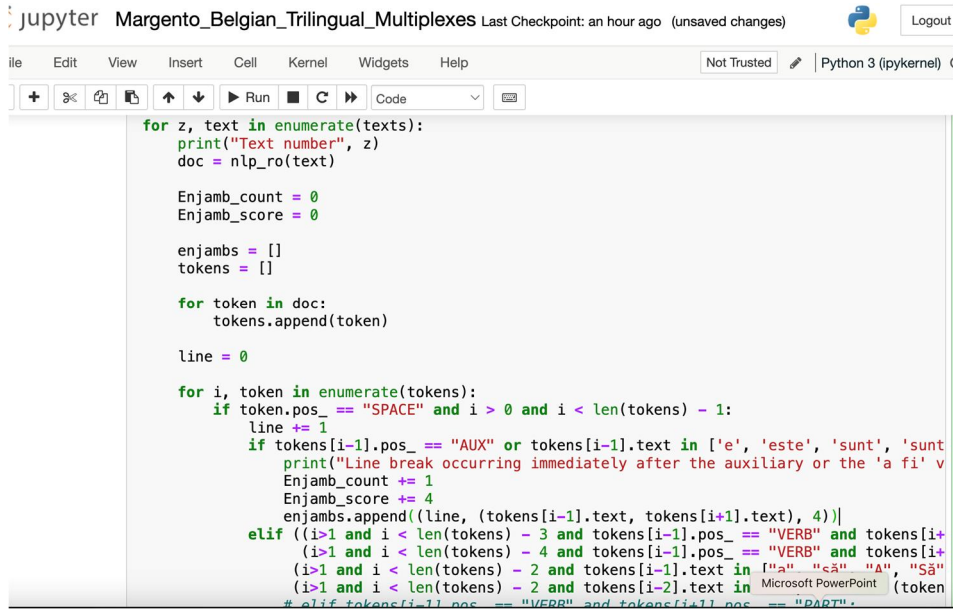
study of translation. And it does so without compromising on the communicative and descriptive model of translation, or on its radical, political, and social implications: the iterative corpus translation places underrepresented poets and poems in a dialog with so-called mainstream one and emphasizes their transformative role in larger and larger amounts of data.

Second, there is the concept of *translation modeling*. Translation involves, when it is not in and of itself, a form or an array of forms of modeling. In poetic-algorithmic and computational translation though, the translation of models and, moreover, the translation of modeling functions, is also at play. As we have seen in our experiments for instance, monolingual corpus multiplexes were translated into sets of inter-related multiplexes, and later on, into an overall trilingual multiplex. The model not only gets translated into other (evolving) models, but also undergoes translation as its implementation reshapes the data while the latter in its turn (re)shapes the model in evolving nested environments. Quantifying poetic features in several languages simultaneously prompted, in our case, conventionally deeming the nodes to be the same in each language multiplex, which in its turn made possible a larger more inclusive multilingual model. Paradoxically though, this actually triggered the emergence of each language (in translation) as distinctive and irreplaceable constituent of the model and modeling actor in its own right. It also opened the door to diversity at scale, as basically any element of any corpus, and thus any corpus really, became replaceable or hybridizable by multiple translations. The line between “original” and translation not only gets blurred, but can disappear altogether as source and target corpora (and languages) shape each other interactively and, in fact, can only be defined, (co-)created, and read as interrelatedly performative. Translation modeling consequently not only involves the modeling of the process of translation but also modeling in or by means of translation.

Therefore, while our concept can be obviously read as modeling translation in/as translating models (or, rather, translating modeling) it also comports the experimental elucidation of a theoretical notion. Modeling—as fundamentally performative, intermedial, and political (see the concept of “*intermodelity*,” Tanasescu 2024a)—and translation—which also intimately shares the same features—inform each other on various levels, some of the most intriguing of which

can become apparent in computationally assembled poetry anthologies. The act of modeling and translating becomes not merely a technical process but a creative and transformative endeavor. Through computational methods, poetry anthologies can be curated and constructed to showcase how different linguistic and cultural elements interact and influence one another, shedding light on the performative and intermedial aspects inherent in both modeling and translation as well as on the hypercyborg, collage, avantgarde, playful, performative, and transmedial translator.

Annex 1: Figures



```

Jupyter Margento_Belgian_Trilingual_Multiplexes Last Checkpoint: an hour ago (unsaved changes) Logout
File Edit View Insert Cell Kernel Widgets Help Not Trusted Python 3 (ipykernel)

for z, text in enumerate(texts):
    print("Text number", z)
    doc = nlp_ro(text)

    Enjamb_count = 0
    Enjamb_score = 0

    enjambms = []
    tokens = []

    for token in doc:
        tokens.append(token)

    line = 0

    for i, token in enumerate(tokens):
        if token.pos_ == "SPACE" and i > 0 and i < len(tokens) - 1:
            line += 1
            if tokens[i-1].pos_ == "AUX" or tokens[i-1].text in ['e', 'este', 'sunt', 'sunt']:
                print("Line break occurring immediately after the auxiliary or the 'a fi' v
                Enjamb_count += 1
                Enjamb_score += 4
                enjambms.append((line, (tokens[i-1].text, tokens[i+1].text), 4))
            elif ((i > 1 and i < len(tokens) - 3 and tokens[i-1].pos_ == "VERB" and tokens[i+
                (i > 1 and i < len(tokens) - 4 and tokens[i-1].pos_ == "VERB" and tokens[i+
                (i > 1 and i < len(tokens) - 2 and tokens[i-1].text in ["a", "ă", "a", "Să"]
                (i > 1 and i < len(tokens) - 2 and tokens[i-2].text in ["Microsoft PowerPoint", "Microsoft PowerPoint"] (token
                # elif tokens[i-1].pos_ == "VERB" and tokens[i+1].pos_ == "PART":

```

Figure 1: A screenshot of the Python script quantifying enjambments in Romanian

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