Multitextuality in RPGs: a ludonarrative synergy model for video game text analysis

Wielotekstowość w grach RPG: model synergii ludonarracyjnej w analizie tekstów w grach wideo

Dagmara Solska
Uniwersytet Gdański, Gdańsk
dagmara.solska@phdstud.ug.edu.pl | ORCID: 0000-0002-0614-9565

Abstract: The article presents the textual potential of games and distinguishes between the types of texts in text-heavy video games. Text types are categorized according to the diegetic/non-diegetic situation vis-à-vis the game world and primary text function. It is assumed that role-playing games (RPGs) such as *Divinity: Original Sin 2* (Larian Studios, 2017) encompass a greater volume of textual material. The proposed corpus analysis model is based on the concept of ludonarrative synergy, text and discourse linguistics, and methods of natural language processing (NLP) and computational linguistics. Two-level text analysis using Python examines the validity of categorizing game texts according to an extended diegetic/non-diegetic model.

Keywords: video games, textuality, role-playing game, applied linguistics, computational linguistics

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1. Introduction

Bernal-Merino (2007) points to the fact that video games can be perceived as a form of multi-textual interactive entertainment. With this consideration in mind, both the variety of textual material and the nature of video games as software artifacts can be seen as a starting point in considering the issues related to operating "in a multitextual environment" (Gonzalez de Benito, 2017, p. 16). Video games can be further codified as relevant objects of study not only within the field of game studies but also in the field of philology, linguistics, and computer science (Burn, 2016). Within the scope of this article, video games will be positioned as multitextual, computer-mediated, ludonarrative entities that emerge through the interplay between ludic (gameplay-oriented) and narrative (storyworld and world-building-oriented) elements. With role-playing games (RPGs) perceived as a language-oriented game genre encompassing a greater textual density, game text can be further classified according to the represented game world situation and investigated from the perspective of a linguistically-motivated, computational methodology-based study of game text types in the proposed diegetic (in-game situation and narrative-oriented) and non-diegetic (external paratext situation and game mechanics-oriented) model.

2. Textuality in video games

2.1. Multimodality, interactivity, and game text

The field of video game studies has experienced an upward trend toward being preoccupied with analyzing games through the lens of multimodality (Balteiro, 2019; Toh, 2019; Wildfeuer, Stamenković, 2022). Indeed, video games can be investigated as "one of the richest examples of multimodal texts" (Mejías-Climent, 2017, p. 99) in which varying modes of communication are employed to create the game world and its textualities. As stated by Mejías-Climent, the medium of video games represents the very first medium to accommodate "multiple stimuli and visual dynamism [...] combined with the active participation of the user" (p. 7). From this standpoint, video games can be further conceptualized as multimedia

interactive entertainment software (Bernal-Merino, 2015) and "'readable' textual artefacts" (Atkins, Krzywinska, 2007, p. 24) constructed by the game's storyworld, mechanics, embedded code as well as audiovisual representation and traversed in players' interaction "transmitted by the tactile channel" (Mejías-Climent, 2017, p. 101).

Through the employment of a multimodal approach, the distinctive characteristic of video games, i.e. interactivity component, is recognized and modes ("codes") are essentially perceived as a starting point in the creation of the "ludonarrative frame" (Toh, 2019) for video game text analysis. With interactivity highlighted as a key component of the game experience, video games can be further construed as interactive textual entities. The concept of video game interactivity, in turn, can be linked to the property of non-linearity of game text "displayed in different locations of the product in obedience to players' actions and which often do not have a clear meaning outside the context of the game" (Pettini, 2022, p. 45).

2.2. Ludonarrative in video games

Since the emergence of video game studies in the early 2000s, a theoretical play-versus-story debate has been somewhat central to the field (Kapell, 2016). While the proponents of a more ludic focus in video game research approach games as instances of play ("action") requiring a unique framework, those in favor of narrative-oriented study favor the identification of game-worlds as representations entrenched in storytelling and the so-called diegetic mode. In arguing for a methodology balanced between the ludic and narrative dimensions, Jones asserts that the discussions within game studies seem to have "moved in a more productive direction" (p. 6), with recent "hybridizing" approaches recognizing the overlap between "play theory" (Ker, 2006) as well as "diegetic gameworld" (Jones, 2008) and its narrative representation. By compounding both ludic, play-focused and narrative-oriented dimensions, the term ludonarrative reflects the "hybrid nature of the medium of video games" (Kokonis, 2014, p. 171) integrating "digital technological base" elements (p. 175) and more traditional forms of storytelling.

The term ludonarrative itself can be understood as a "structural quality of the video game artifact [...] or a high-level framework to understand video games" (Koenitz, 2018, p. 1). Despain and Ash propose the term

ludonarrative harmony to signify "the synchronized interaction between the mechanics and narrative supported by systems that creates a unified story" (2016, p. 2). With this in mind, the constructed narrative "provides context for mechanics" (p. 3). As stated by O'Hagan and Mangiron (2013), this type of ludonarrative synergy in which play and story exist in an interplay can be seen as relevant in the analysis of story-oriented video games such as role-playing games due to the fact that they entail a greater textual variety inherently embedded in game mechanics. In the scope of the following article, the concept of ludonarrative is employed as both a "structural quality" (Koenitz, 2018) organizing gameplay-related (ludic) and narrative-oriented (storyworld and world-building) texts as well as a key component of the analytical framework for discerning game texts based on their situation with regard to the represented gameworld, a model introduced in later sections.

2.3 Game genre and text type(s) dependency

Clearwater argues that a "genre-conscious approach is critical to game analysis (regardless of any disciplinary, theoretical, or methodological starting point)" (2011, p. 39) due to the importance of outlining "traditions and affinities", i.e. bounded conventions, in mapping the "fundamental characteristics" of video games. In fact, it can be argued that the categorization of video games into convention-bound genres maps out prominent text types positioned in the gameworld. Mangiron and O'Hagan (2006) indicate that certain video game genres such as role-playing games (RPGs) display significantly more complex, branching narrative structures and text-heavy configurations; thus, RPGs are seen as a genre that encompasses a greater volume and variety of text types.

Due to the fact that the dialogic nature of role-playing games can be traced back to the tabletop tradition of storytelling, they can be perceived as a "highly language oriented" (Mäyrä, 2017, p. 1) genre that "tends to prioritize reflection, reading and strategy over pace or spectacle" (Carr et al., 2006, p. 21). Mäyrä argues that with game engines offering "more support for dialogue and audiovisual storytelling" (p. 9), RPGs are to a greater degree "heavy with textual material […]". Furthermore, Erickson (2009) asserts that writing for RPGs necessitates the implementation of interactive storytelling in game design; for instance, through organizing text(s) in broad dialogue

tree structures to enable different narrative paths to be chosen by the player. The aforementioned features of role-playing games contribute to the creation of structurally complex games with a substantial diegetic potential particularly relevant from the perspective of a linguistically-motivated study.

3. Textuality in linguistic approaches

3.1. Interdisciplinary relevance of text and discourse linguistics

Van Dijk (1980) claims that text linguistics embodies all research on language in which the text is situated as the focal point of the inquiry. In this view, text linguistics does not constitute a single, unified framework but rather an evolving field of text-oriented research in new contexts. Labocha suggests that text linguistics presupposes a "broader context than only the strictly linguistic one" (2011, p. 60). With text linguistics conceptualized as a "science of texts" (ibid.), the interdisciplinary approach to the study of text and textuality is underlined.

In their complexity-based model of discourse comprehension, Kintsch and van Dijk perceive discourse as processed from the lower (word) unit level to its macrostructure. The notion of text can be understood in terms of "overall textual structures" (1983, p. 10) that exhibit "global" organization. In fact, van Dijk defines the term "text" as "the abstract theoretical construct underlying [...] discourse" (1977, p. 3) and "macro-structures" associated with the global meaning oftentimes equated with typology. Van Dijk construes type as a "name of a class of objects that are considered 'identical' from a certain point of view" (1972, p. 298), with objects categorized within a given class sharing "a set of common properties" (ibid., p. 299). In this view, macrostructures are seen as particularly relevant in discerning text types on the basis of text-internal and global structural organization. Although van Dijk enacts a literary/non-literary (narrative and functional) textual typology, this type of categorization can be re-established in the context of narrative and ludic game texts.

3.2. Text, text typology, and computational linguistics

Considering the relationship between computational and corpus approaches, Xiao (2010) recognizes that natural language processing

(NLP) and corpus linguistics are closely-related fields since both employ electronic corpora for linguistic information extraction purposes, with corpora seen as a collection of texts structured according to external linguistic criteria. Jurafsky and Martin (define the field of NLP as the practical field of computational linguistics, with natural language systems research "developing computational models for language processing from a corpus" (2020, p. 14) in areas of syntactic processing, semantic interpretation, and discourse pragmatics.

Considering text typology from the perspective of computational linguistics, corpus-based text profiling "supports different types of segmentation and markings of the primary textual data" (Folch et al., 2000, p. 4). Typological marking stems from the observation of the statistically-represented textual data while NLP-based segmentation related to part-of-speech (POS) tagging, vocabulary, and morpho-syntactic patterns is examined. In the scope of this article, typological marking from extracted properties of texts is based on text segmentation and internal text properties in order to establish types of game text.

4. *Divinity: Original Sin II:* two-level, corpus-based video game text analysis

4.1. Ludonarrative synergy game text model

Galloway introduces the terms diegetic and non-diegetic to categorize the "game's total world" elements with regard to their situation in the "gaming apparatus". In this framework, diegetic texts include "the game's total world of narrative actions" (2006, p. 7) and non-diegetic texts encompass all elements "outside" of what "constitutes a pretend world of character and story" (ibid.). O'Hagan and Mangiron employ the diegetic/non-diegetic categorization to position types of game text entailed in game localization processes to "examine textual characteristics of a video game [...]" (2013, p. 153).

Basing on Galloway's and O'Hagan and Mangiron's typologies, the author proposes an extended categorization of game texts in a ludonarrative synergy model (Table 1) that considers the interplay between play and story textualities.

Table 1. Ludonarrative synergy game text categorization – diegetic (narrative) and non-diegetic (ludic) texts

Diegetic text	Non-diegetic text
Storyline narrative text	User Interface (UI)
World-building narrative text	System messages and pop-ups
World-building ludic text*	Player tutorials
Voice-over	Paratext

In the proposed model, diegetic texts encompass storyline narrative text (storyworld-related text, character dialogue), world-building narrative text (lore material), and world-building ludic text (item, skill, and class "flavor" text) bridging the gap between narrative and ludic textuality, thus, marked with an asterisk as a hybrid case in Table 1. On the other hand, non-diegetic texts cover gameplay-focused and technical texts such as UI text (menus), player tutorials informing the player about gameplay, and a highly mixed category of associated paratext (Bernal-Merino, 2015). Externally situated paratext includes legal texts (end-user license agreement), informative texts such as ReadMe files, game manuals, and the official game website. With the role-playing genre viewed as language-oriented and entrenched in the narrative game genre, diegetic (narrative and world-building-focused) texts are perceived as a more productive type of text. Grounded in van Dijk's (1972) concept of macrostructures introduced in section 3.1, the analysis of game text types is situated on two levels: micro-level of text-internal properties (lexical and syntactic analysis) and macro-level (clustering on 'global' level).

4.2. *Divinity: Original Sin 2* and text-heavy format

Divinity: Original Sin 2 (Larian Studios, 2017) is a turn-based, "narrative-driven, next-generation sandbox RPG set in a sprawling world with a story that reacts to who you are and what you have done" (Bandai Namco Europe, 2018). *Divinity: Original Sin 2* offers a highly customizable narrative experience in which "you [player] define the world, the world

does not define you [player]" (Larian Studios, 2022). In both of these definitions, the intricate narrative and rich world-building are put at the forefront of the game experience. Within the storyworld of Rivellon, the Godwoken (player character) is urged by one of the Seven Gods, depending on the origin story chosen, to pursue Divinity in the battle for ascension to godhood.

Due to its narrative-driven nature and pen-and-paper-like freedom, *Divinity: Original Sin 2* can be situated as especially relevant in the analysis of the text-heavy format. The corpus of game texts was compiled from text files stored in the localization folder in PAK file format, *Divinity: Original Sin 2 Wiki*, and scraped from the official website and, subsequently, grouped according to their game world situation. The dialogue and world-building-related materials in. pak files were extracted and saved in an. xml file. In order to extract plain text from the. xml document, the file was consequently parsed using Python and ElementTree package and then saved in UTF-8 encoding. Crucially, due to the fragmentary and non-linear nature of game texts organized in language strings, the process of text retrieval in a structured body such as corpora is impeded.

4.3. Micro-level text analysis

4.3.1. Lexical analysis: TF-IDF and keyword extraction

In this study, the keyword extraction with Scikit-learn Python library and TF-IDF (term frequency-inverse document frequency) vectorization is used to identify words and phrases representing the text's main, relevant content for document classification by similarity purposes. TF–IDF as one of the common information retrieval methods in text classification "measures the relevance of a token to a document" (Bengfort, Bilbro, Ojeda, 2018, p. 300). That is to say, TF-IDF is used to calculate the relevance of a word to a document in a collection of documents in a corpus. Through the employment of the TF-IDF measure, the most common words underlying both diegetic and non-diegetic game texts are recognized as one of the text-internal features organizing the divide between the two overarching types of text.

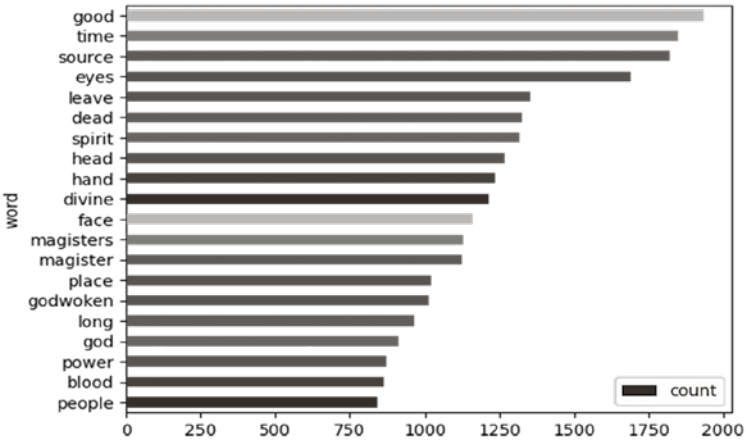

Figure 1. Top 20 most common words in diegetic texts visualized with *Seaborn* Python library

Crucially, as can be seen in Figure 1, the most relevant words in diegetic texts refer to world-building and narrative-oriented elements, with "source" (world energy in Rivellon), "divine" related to the main story "divine ascension", "magisters" as a division of the antagonist Divine Order, and "godwoken" associated with the title of the God's champion recognized as crucial to the text.

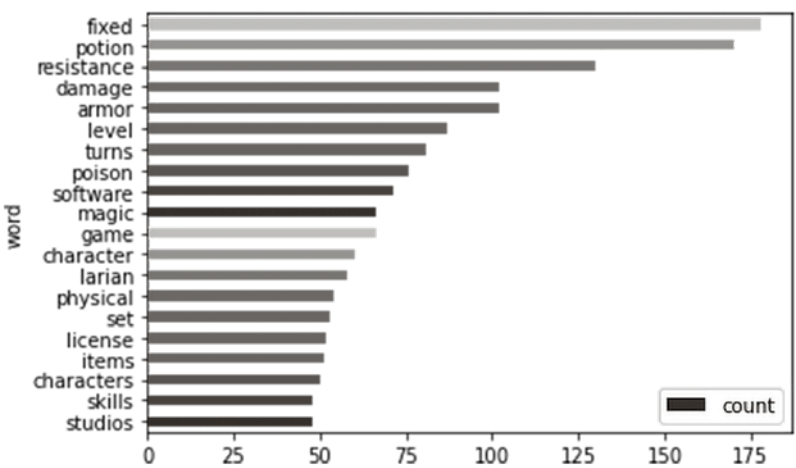

Figure 2. Top 20 most common words in diegetic texts visualized with *Seaborn* Python library

At the same time, non-diegetic texts include content words related to game mechanics including "potion", "resistance" as a defense statistic, "damage", "level" related to the in-game character leveling mechanic, and "turns" associated with the turn-based combat. Additionally, the words "software" and "game" can be perceived as linked to the nature of the video game medium and its ludic dimension.

4.3.2 Syntactic analysis: grammar-based feature extraction

POS tagging can be defined as a grammar-based feature extraction (Bengfort, Bilbro, Ojeda, 2018). Following POS tagging, n-grams predicting the occurrence of a given word based on the occurrence can be employed to investigate text structures. While traditional n-grams recognize sequences in-text, syntactic n-grams (sn-grams) are "taken by following syntactic relations in syntactic trees" (Sidorov et al., 2013, p. 14). In the study, the SNgramExtractor module for Python is integrated to extract syntactic relations (SR tags).

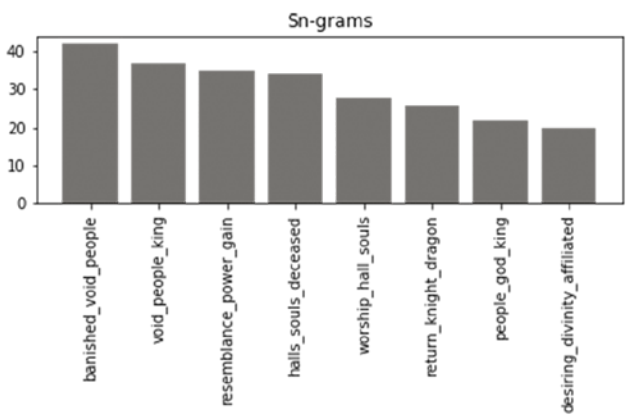

Figure 3. Top 8 most common sn-grams in diegetic texts visualized with *Matplotlib* Python library

In the case of texts categorized as diegetic, the recognized sn-grams seem to refer to narrative actions vital to the storyworld including the banishment of the people to the Void and the return of the "God King". Moreover, the extracted sn-grams are associated with the world-building dimension referring to locations in-game such as the Hall of Echoes to which the souls go to rest.

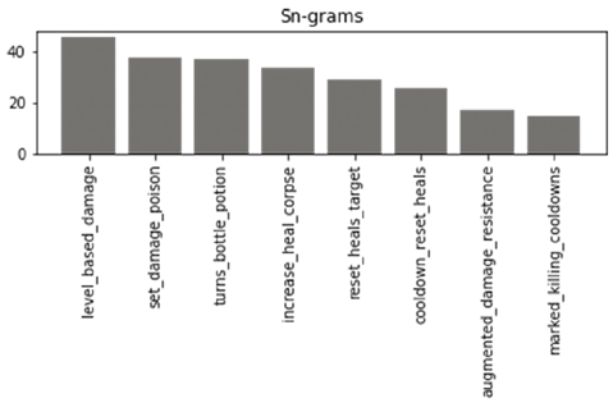

Figure 4. Top 8 most common sn-grams in non-diegetic texts visualized with *Matplotlib* Python library

As far as non-diegetic texts are concerned, gameplay-specific (ludic) sequences are highlighted. Sequences related to in-game statistics including attributes (e.g. level_based_damage), combat abilities (e.g. increase_heal_corpse), talents and skills-related properties (e.g. cooldown_reset_heals) arise as the most common combinations.

4.4 Macro-level text analysis

4.4.1. K-means clustering and diegetic / non-diegetic framework

The TF-IDF algorithm and the K-means clustering method are applied to the *Divinity: Original Sin 2* game text corpus to classify the previously introduced diegetic/non-diegetic texts through grouping (clustering) of texts according to their "global" structure. Prior to attaining the relevant features with TF-IDF, preprocessing ought to be performed on textual data to obtain clean data for the process of text grouping. The natural language toolkit Python library's stopword list including common words to be filtered out is essentially appended and used on the TfidfVectorizer feature extraction in Scikit-learn. The fit_transform() method is employed so as to enable the dataset normalization implementation. The k-means clustering method is hereby chosen for the game text grouping since the number of clusters (the value of k) ought to be specified. The optimal number of clusters is, thus, based upon the model of ludonarrative game texts, with the value of k set to 2. In turn, Cluster 0 and Cluster 1 are formed.

Table 2. Top 10 words in cluster 0 (diegetic) and cluster 1 (non-diegetic)

Cluster 0	Cluster 1
lucian, seven, god, king, one, divine, source, lords, power, banished	fixed, game, larian, damage, level, original, divinity, sin, potion, software

Each of the determined centroids is organized into a descending list ordered by word relevance. As can be seen in Table 2, the top 20 words in two clusters are specified. The top words in Cluster 0 correspond to the lexical analysis results in diegetic texts; in other words, the most frequent words in Cluster 0 encompass words related to the storyworld and game's lore (lucian, seven, king, divine, source, lords) as well as narrative action (banished, power). Cluster 0, hereby referred to as diegetic, coincides with story-driven and world-building aspects of diegetic texts.

The most common words in Cluster 1 display the association with the words previously recognized as non-diegetic texts. The most relevant words in Cluster 1, further referred to as non-diegetic, include game mechanics-related words, particularly with regard to associated, technical texts ('fixed' as in patch notes), the nature of the game medium (game, larian, original, sin, software), and play-related terminology (damage, level, potion).

5. Conclusion

It is argued that certain convention-bound genres such as narrative-oriented RPGs exhibit a rich textual layer (text-heavy format), particularly relevant in the linguistically-motivated analysis of game textuality, with the linguistic layer inherently embedded in game mechanics and base code. Following Galloway's (2006) and O'Hagan and Mangiron's (2013) assumptions, the author proposes an extended categorization of game elements according to their gameworld exposure. Thus, game texts are grouped into diegetic (narrative-oriented) and non-diegetic (ludic) texts in a ludonarrative synergy model, a hybridizing framework structuring both story and play texts. In the study, computational methods are seen

as relevant tools in text-oriented language research. The results obtained in the textual analysis of *Divinity: Original Sin 2* (2017) indicate the validity of the categorization of diegetic/non-diegetic texts, with underlying text-internal differences recognized between text types (micro-level) and elements grouped according to their overall diegetic/non-diegetic orientation (macro-level) associated with the global 'content' of the text (Van Dijk, 1980).

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Dagmara Solska – MA, linguist, PhD student at the Institute of English and American Studies, Department of Glottodidactics and Natural Language Processing, University of Gdańsk, Poland.

Wielotekstowość w grach RPG: model synergii ludonarracyjnej w analizie tekstów w grach wideo

Abstrakt: Artykuł przedstawia potencjał tekstowy gier i rozróżnia typy tekstów występujące w opartych na tekście (ang. *text-heavy*) grach wideo. Typy te kategoryzowane są w zależności od sytuacji diegetycznej/niediegetycznej względem świata przedstawionego w grze oraz nadrzędnej funkcji tekstu. Przyjmuje się, że gry fabularne (RPG) takie jak *Divinity: Original Sin 2* (Larian Studios, 2017) zawierają większą ilość materiału tekstowego. Proponowany model analizy korpusowej opiera się na koncepcji synergii ludonarracyjnej, lingwistyce tekstu i dyskursu oraz metodach przetwarzania języka naturalnego (NLP) i lingwistyki komputerowej. Dwupoziomowa analiza tekstów za pomocą języka Python bada zasadność kategoryzacji tekstów według poszerzonego modelu diegetycznego/niediegetycznego.

Słowa kluczowe: gry wideo, tekstualność, gry fabularne, lingwistyka stosowana, lingwistyka komputerowa