

# Disinformation vs. Trustworthy News: A Knowledge Graph-Based Analysis of Narrative and Framing Patterns

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## Abstract

This study examines narrative construction patterns in disinformation and trustworthy news articles through analysis of English articles covering international events from 2015 to 2023. Using a methodological framework that combines large language models and knowledge graphs, differences between disinformation and trustworthy news articles were examined. The research revealed distinct patterns in narrative strategies: disinformation sources predominantly employed emotional language, moral absolutism, and cultural threat narratives, while trustworthy sources maintained measured tones, methodological transparency, and analysis with rich context. Knowledge graph analysis demonstrated that disinformation narratives exhibit fragmented structures that rely on hubs with emphasis on abstract connections, whereas trustworthy narratives show more balanced, interconnected networks with concrete relationship patterns.

## Keywords

disinformation, social framing, narrative construction, LLMs, knowledge graph

## 1. Introduction

The increase of disinformation in the media presents significant challenges to public understanding and democratic discourse as well [1, 2]. As digital platforms facilitate rapid information dissemination, distinguishing between reliable journalism and deliberately misleading content has become particularly important. This study examines the differences in narrative construction and sociocultural framing in disinformation and trustworthy news articles, aiming to contribute to the understanding of how these approaches shape public perception and social discourse.

In recent years we have witnessed a lot of coordinated disinformation campaigns, particularly concerning major geopolitical events [3, 4], public health crises [5, 6], and cultural conflicts [7, 8]. Therefore, extensive research has examined the technical aspects of disinformation spread and its immediate impact on public opinion, e.g., as in [9, 10, 11, 12].

Also, Knowledge Graph-based approaches have emerged as powerful tools for enhancing semantic precision and causal relationships in narrative analysis, such as in [13]. Causal relationships are essential for understanding story development complex news narratives [14]. Besides, in the domain of bias detection, it was demonstrated that incorporating frame-based knowledge with text models significantly improves the detection of bias and stance in news narratives, providing a more nuanced understanding of narrative framing [15]. The construction of domain-specific Knowledge Graphs for news has been another significant development, such as in [16], where developed comprehensive ontology in news contexts enabled sophisticated applications in bias detection and narrative synthesis.

Furthermore, cross-cultural narrative analysis has revealed interesting patterns in how different societies frame similar issues, such as climate change narratives across cultures [17], where LLMs were used in finding distinct emphases in North American Chinese sources, highlighting the importance of cultural context in narrative construction and interpretation. In addition, it was demonstrated that Temporal Knowledge Graphs combined with unstructured data from news articles can improve temporal

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reasoning and event prediction [18], expanding applications in event-centric narrative reasoning, particularly valuable for tracking narrative evolution over time.

The impact of narratives on public sentiment has been quantitatively studied, e.g., in [19], who found significant correlations between exposure to pessimistic news narratives and heightened negative public sentiment. Moreover, event-centric approaches to news analysis have been advanced in, e.g., [20], who developed methods for retrieving event-relevant news articles to support narrative continuation tasks, enhancing the construction of cohesive narratives from fragmented events. Finally, recent developments in processing long narratives have addressed previous limitations in text analysis, e.g., by introducing a novel architecture integrating dynamic Knowledge Graphs with LLMs [21], which helps to improve story comprehension capabilities.

These briefly introduced advances in computational narrative analysis, among others, have significantly enhanced our ability to understand and analyze news media content. This study aims to identify and analyze the distinctive patterns in narrative construction in disinformation and trustworthy news articles to examine how sociocultural elements are framed and deployed in each type of content in order to evaluate the implications of different narrative approaches for public understanding and social cohesion.

## 2. Data

For this study part of the dataset for multilingual detection of pro-Kremlin disinformation in news articles [22], containing data on disinformation and trustworthy news articles, was used. As the full text of the news articles was not publicly available, to reconstruct the dataset URL links of the articles were used with DiffBot API<sup>1</sup> (free for academic purposes) to acquire them. Only articles in English were selected. Some articles attempted to acquire were no longer available or have been modified. So, although the full dataset has 18 249 articles in 42 languages that span over 8.5 years (since 2015) and cover 508 topics, after all the filtering and cleaning the part used in this study was made of 308 disinformation news articles (most frequent sources: RT, TASS, Sputnik) and 302 – trustworthy news articles (most frequent sources: BBC, the Guardian, Polygraph.info, covering such topics as Western / NATO -Russian relations, Russia-Ukraine conflict, allegations of chemical weapons, Syrian civil war, geopolitical tensions, disinformation/propaganda narratives, conspiracy theories). Labeling news articles as ‘disinformation’ and ‘trustworthy’ is based on the original dataset.

## 3. Methods

The pipeline for this study consisted of the following components:

1. **Step 1. Summarization:** to simplify construction of knowledge graph to be used in later stages, the cleaned news articles were summarized with DistilBART-CNN-12-6 model<sup>2</sup>, which is a distilled version of the BART model, specifically optimized for text summarization tasks [23]. To learn language representations, BART and its derivatives combine a transformer-based design with a denoising autoencoder.  
For generating summaries, all the articles in the dataset were truncated to a maximum input length of 1024 tokens. The generated summaries were between 50 and 128 tokens in length. To ensure quality, summaries were manually inspected and evaluated. These summaries were integrated into the dataset.
2. **Step 2. Relational triple extraction:** to extract triples, we applied REBEL (Relation Extraction By End-to-end Language generation) [24], which uses a sequence-to-sequence architecture based on BART for extraction of relational triples. It combines Named Entity Recognition (NER) and Relation Classification (RC) into a single task and covers >200 relationship types.

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<sup>1</sup>Accessible at <https://www.diffbot.com/>

<sup>2</sup>Accessible at <https://huggingface.co/sshleifer/distilbart-cnn-12-6>

The pre-trained version without fine-tuning was used and it was applied to summaries of the articles from Step 1. The triples (Entity-Relation-Entity) were extracted for each sentence and then aggregated across all sentences in each summary, ensuring consistency and removing duplicates. The extracted triples were manually validated for correctness and integrated into the dataset to be used for constructing a knowledge graph.

3. **Step 3. Augmentation with sociocultural data:** ChatGPT-4o was used for augmenting data with cultural references, idioms and collocations, sentiments and emotions, sociocultural context and relationships between cultural references and sentiments-emotions. The following prompt was applied for this task:

Text:  
[Insert article text here]

Instructions:  
From the above text, identify and list:

- Cultural references
- Idioms or expressions
- Sentiments and emotions expressed
- Sociocultural context or factors influencing the narrative
- Relationships among these elements

Example Output:

- Cultural References:
  - "Global Climate Conference"
  - Reference to international efforts on climate change
- Idioms/Expressions:
  - "Leading by example"
- Sentiments/Emotions:
  - Optimism
  - Concern
- Sociocultural Context:
  - Emphasis on environmental responsibility in Country A
  - Economic concerns in industrial sectors
- Relationships:
  - The presidential's pledge reflects Country A's cultural emphasis on sustainability.
  - Industrial lobbyists' criticism highlights societal tension between economic growth and environmental conservation.

To validate and/or enrich the results, Wikidata<sup>3</sup> was used for cross-referencing ChatGPT-4o outputs using SPARQL queries. A manual review of the extracted sociocultural data was performed as well to confirm accuracy and relevance. This data was integrated into the dataset and was used in the knowledge graph as well.

4. **Step 4. Knowledge graph construction:** For constructing the knowledge graph, we used extracted relational triples. In this graph structure entities (nodes) of the triples were linked by their relations (edges). Metadata and extracted sociocultural data were included in the graph as well. Python libraries NetworkX<sup>4</sup> and rdflib<sup>5</sup> were used for this task.

The schema of the knowledge graph focus on key entities – people, organizations, locations, events, articles. These entities are interconnected through the relationships implemented in REBEL model, such as *locatedIn*, *leaderOf*, *memberOf*, *relatedTo*, *participatedIn*, etc. Furthermore, each entity have associated metadata, e.g., source article, the article's publisher, publication date, class ('disinformation' or 'trustworthy'), sentiment. Additional properties include sociocultural context, such as cultural references, idioms, and topics that are associated with the entities. Events are also described by a point in time. This schema was validated via heuristic rules.

<sup>3</sup>Accessible at <https://www.wikidata.org/>

<sup>4</sup>Accessible at <https://github.com/networkx/networkx>

<sup>5</sup>Accessible at <https://github.com/RDFLib/rdflib>

5. **Step 5. Comparative analysis:** the analysis of narrative construction and sociocultural framing in disinformation and trustworthy news articles was performed by querying over knowledge graph in natural language with an LLM [25, 26, 27], for which Claude-3.5-Sonnet-200k was chosen due to its long context window. Thus prompting was applied to extract key patterns with supporting examples. The prompts consisted of a series of analytical questions, which were applied for querying over graphs constructed from disinformation and trustworthy news articles separately (Table 1). The extracted patterns were inspected manually and a qualitative analysis was performed for comparison.

**Table 1**  
Analytical questions

| Stage   | Prompts  |
|---|--|
| 1. Initial Exploration and Pattern Identification | "I want to perform an analysis of how sociocultural factors influence narrative construction in news articles. The knowledge graph I want to use is attached. What are the key patterns? Can you provide an example for each of the key patterns and present the results visually, e.g., mermaid diagram?" |
| 2. Pattern Elaboration                            | "Could you elaborate on these patterns and provide more specific examples from the knowledge graph?"   |
| 3. Cultural Framework Analysis                    | "Analyze the cultural context patterns in more detail from the knowledge graph, breaking it down into key cultural frameworks and their influence on the narrative construction."<br>"Could you elaborate on the cultural framework concept as represented in the knowledge graph?"                        |
| 4. Specific Focus Areas                           | "Please examine in more detail cultural differences in the narratives."<br>"Please analyze how cultural differences are systematically used to frame political conflicts in the knowledge graph."<br>"How do historical narratives support current political positions according to the data?"             |
| 5. Narrative Construction Mechanics               | "Elaborate on how cultural frameworks shape narrative construction based on the knowledge graph data."   |
| 6. Synthesis and Key Findings                     | "What are the key findings from this analysis? Please provide specific examples from the knowledge graph."<br>"Could you provide more context from the knowledge graph to support these findings?"   |

## 4. Results

### 4.1. Knowledge Graph

To extract key patterns of narrative construction and sociocultural framing and to compare their differences with respect to disinformation and trustworthy news articles, 2 knowledge graphs following the steps in Section 3 were constructed. The summary of both knowledge graphs is presented in Table 2.

Both graphs share similar entity categories, however, the disinformation graph emphasizes abstract concepts and a broad "other" category, while the trustworthy graph highlights specific events and verifiable concepts, which reflect different focuses. Regarding relationships, in the disinformation knowledge graph among the most common ones are `diplomatic_relation` and `location` which often blur specificity by including entities in broad, abstract contexts. The trustworthy graph focuses on more concrete links like `shares_border_with` and `point_in_time`. While both graphs feature political and diplomatic relationships, the disinformation graph exhibits a broader variety of abstract connections, whereas the trustworthy graph demonstrates a more structured and evidence-based relationship network.

Both graphs have a core-periphery structure [28] with Russia and Ukraine as central hubs. The

**Table 2**

Comparative analysis of knowledge graphs

| Aspect                             | Disinformation graph  | Trustworthy graph  |
|------------------------------------|---|--|
| <b>Entity distribution</b>         | ~1,000 entities   | ~800 entities  |
| <b>Most frequent relationships</b> | Diplomatic_relation, member_of, position_held, country, location/-geographical. | Diplomatic_relation, shares_border_with, position_held, located_in, point_in_time. |
| <b>Centrality and hubs</b>         | Core-periphery structure with key hubs: Russia, Ukraine, NATO, EU, US.          | Core-periphery structure with key hubs: Russia, Ukraine, EU, US.                   |
| <b>Thematic clustering</b>         | Military and security (30%), diplomacy (25%), politics (20%), economics (15%).  | International relations (25%), military/security (20%), health/pandemic (15%).     |

disinformation graph clustered around military and political themes and appears fragmented and hub-reliant. The trustworthy graph, on the other hand, is more balanced and interconnected with denser subclusters (diplomatic, military, health), which shows clearer thematic distinctions.

## 4.2. Narrative Construction Patterns

This section presents summarized patterns of narrative construction in disinformation and trustworthy news articles. The patterns were extracted by querying over knowledge graphs in natural language with an LLM (Claude-3.5-Sonnet-200k). A summary of the findings is presented in Table 3.

**Disinformation Narrative Patterns.** A set of interconnected narrative strategies was found prevalent in disinformation news, revealing efforts to manipulate emotions, construct rigid worldviews, and dismiss alternative perspectives, which were often used to enhance polarization and reinforce specific agendas [29]. One dominant characteristic of disinformation narratives is the use of the binary framework, which involved a reliance on absolutist claims and stark oppositions, often framed as "us versus them" – "us" (e.g., Russia, China, Belarus) as allies with positive framing, while "Them" (e.g., NATO, EU, US) as adversaries with negative framing. An example of this pattern would be portrayal of Russia as the betrayed party and the West as untrustworthy. These narratives present issues as moral dichotomies and use emotional triggers such as moral outrage or cultural anxiety to amplify the persuasive impact as outlined in [30].

Another recurring pattern is cultural identity framing, where cultural differences are presented as fixed and inherently oppositional (e.g., Russian culture was depicted as rooted in tradition, unity, and moral values, while Western culture is described as declining). Narratives also highlighted civilizational clashes and the notion that traditional values are under threat (e.g., Russian identity is framed as under siege by Western liberalism). Also, selective historical interpretations were employed to support these claims, reinforcing political agendas. Furthermore, another frequent strategy involved authority claims, where disinformation sources asserted unqualified authority over the truth while discrediting opposing viewpoints. This approach often incorporated conspiracy theories and selective citations that align with the desired narrative, thus aiming for distrust in mainstream or evidence-based sources [31].

Finally, disinformation narratives engaged in crisis portrayal, framing issues as existential threats to cultural identity or civilization. Instead of presenting crises as practical challenges that required a solution, they were depicted as moral or cultural emergencies via emotionally charged language, moral absolutism, and selective evidence to heighten fear, urgency, and defensiveness. More extensive qualitative studies, such as [32], support these results.

**Trustworthy News Patterns.** In contrast, trustworthy news sources employed narrative patterns that aligned with journalistic standards, i.e., fostering critical thinking and nuanced understanding via factual accuracy, emotional balance, and the acknowledgment of complexity as it has been outlined in

**Table 3**

Comparative analysis of narrative patterns in disinformation and trustworthy news sources

| Disinformation patterns  | Trustworthy News Patterns   |
|--|---|
| <b>1. Binary framework construction</b> <ul style="list-style-type: none"> <li>• Absolutist claims</li> <li>• "Us versus them" dichotomies</li> <li>• Emotional triggers</li> <li>• Universal truth claims</li> </ul>                          | <b>1. Measured emotional framing</b> <ul style="list-style-type: none"> <li>• Balanced emotional content</li> <li>• Factual documentation</li> <li>• Analytical context</li> <li>• Journalistic objectivity</li> </ul>                                |
| <b>2. Cultural identity framing</b> <ul style="list-style-type: none"> <li>• Static cultural identities</li> <li>• Civilizational clashes</li> <li>• Traditional values under threat</li> <li>• Selective historical interpretation</li> </ul> | <b>2. Cultural complexity recognition</b> <ul style="list-style-type: none"> <li>• Evolving cultural identities</li> <li>• Shared values acknowledgment</li> <li>• Multiple cultural perspectives</li> <li>• Contextualized interpretation</li> </ul> |
| <b>3. Authority claims</b> <ul style="list-style-type: none"> <li>• Unqualified truth assertions</li> <li>• Conspiracy narratives</li> <li>• Selective citation</li> <li>• Opposition discrediting</li> </ul>                                  | <b>3. Multi-stakeholder perspective</b> <ul style="list-style-type: none"> <li>• Multiple viewpoints</li> <li>• Diverse stakeholder voices</li> <li>• Complexity recognition</li> <li>• Balanced representation</li> </ul>                            |
| <b>4. Crisis portrayal</b> <ul style="list-style-type: none"> <li>• Existential threats</li> <li>• High-intensity emotional language</li> <li>• Moral absolutism</li> <li>• Cultural threat narratives</li> </ul>                              | <b>4. Evidence-based documentation</b> <ul style="list-style-type: none"> <li>• Multiple authoritative sources</li> <li>• Independent verification</li> <li>• Documentary evidence</li> <li>• Cross-referenced information</li> </ul>                 |
| <b>5. Media control narrative</b> <ul style="list-style-type: none"> <li>• Exclusive truth claims</li> <li>• Alternative viewpoint delegitimization</li> <li>• Information space control</li> <li>• Media bias accusations</li> </ul>          | <b>5. Solution-focused approach</b> <ul style="list-style-type: none"> <li>• Practical policy proposals</li> <li>• Conflict resolution mechanisms</li> <li>• International cooperation</li> <li>• Constructive developments</li> </ul>                |
| <b>6. Historical memory manipulation</b> <ul style="list-style-type: none"> <li>• Selective interpretation</li> <li>• Political narrative support</li> <li>• Alternative views dismissal</li> <li>• Historical continuity claims</li> </ul>    |   |

e.g., [33]. A key feature was a measured emotional framing, where emotional impact was acknowledged and used to highlight human impact, but balanced with factual documentation and analytical context (e.g., coverage of Ukraine in relation to Russo-Ukrainian war emphasizes "resilience" (emotional impact) while documenting military and geopolitical developments (factual context)).

Trustworthy sources also recognized cultural complexity via highlighting the changing and sophisticated nature of cultural identities. Rather than portraying cultural differences as fixed or oppositional, they focused on shared values, presented multiple perspectives and provided a context for understanding cultural dynamics (e.g., reports on Crimea include narratives about cultural preservation for Crimean Tatars, Russian heritage, and Ukrainian sovereignty, illustrating the region's complex and interconnected identities). Also, trustworthy sources included multi-stakeholder perspectives, presenting diverse viewpoints, reflecting the complexity of issues and offering practical frameworks for solutions, thus promoting inclusivity and encouraging audiences to engage with different perspectives as it has been described in, e.g., [34].

Evidence-based reporting was another key pattern in trustworthy news which included reliance on multiple authoritative sources, independent verification, and cross-referencing. Such practices increase credibility and ensure that narratives are grounded in factual accuracy [35]. Finally, trustworthy reporting applied a solution-focused approach, emphasizing practical policy proposals, conflict resolution mechanisms, and frameworks for international cooperation, which aimed to inform and empower audiences with a focus on constructive developments and actions.



## 5. Discussion and Conclusion

This work-in-progress highlighted how narrative patterns impact the presentation of information in disinformation and trustworthy news articles. Disinformation narratives tended to employ cognitive biases via oversimplification (e.g., using absolutist claims), emotional manipulation (e.g., using high-intensity emotional language), and cultural isolation (e.g., employing selective historical interpretations). This way disinformation aims to foster social polarization and discourage rational discussions as introduced in [30]. In contrast, trustworthy news narratives promoted informed decision-making (e.g., via evidence-based documentation), cross-cultural dialogue (e.g., via acknowledging shared values), and democratic discourse (e.g., by providing multi-stakeholder perspective) in following journalistic standards and offering nuanced, evidence-based perspectives.

These findings highlight the need for counter-disinformation strategies that go beyond fact-checking to address disinformation narrative structures that make it compelling to the public. For example, broader strategies could include media literacy [29, 36], strategic communication [37, 38, 39], and other approaches. Such interventions should reduce emotional manipulation, as reported in [40], also challenge simplistic dichotomies as, e.g., described in [29], and promote narratives that encourage critical thinking, as outlined in [41]. Also, this research contributes to the identification and study of disinformation by providing a structural framework for analyzing narrative construction via the use of knowledge graphs. This approach demonstrated a potential to identify disinformation patterns and distinguish reliable journalism from misleading content. The graph-based methodology also allowed examining how sociocultural framing, emotional triggers, and cultural references are strategically used to influence public perception.

However, some limitations of this study need to be taken into consideration. The study's focus on English content restricts its applicability to other linguistic and cultural contexts. Also, while manual inspection of the results was performed at each stage of the study, a more thorough evaluation combining automating and expert-based methods would be beneficial. Temporal shifts in narrative patterns also require further exploration to understand the evolution of disinformation strategies. Additionally, the binary classification of sources as either disinformation or trustworthy oversimplifies the complexities of contemporary media. Therefore, automated analysis may overlook some elements, especially subtle ones such as irony, cultural nuances, or implicit biases. It is planned to address these issues in the future to develop a more comprehensive understanding of narrative dynamics in media.

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