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When Violence No Longer Hurts: A Study of Public Desensitization Reflected in News Coverage of the Russia-Ukraine War

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Introduction

In today's media environment, people are increasingly used to consuming global event-related content through news outlets and social media platforms inconsistently. For instance, news organizations may send push notifications about updates, such as the Israeli attack on Iran in June 2025. Meanwhile, TikTok provides real-time clips of the ongoing war, exposing users to scenes of violence, such as the destruction of residential areas and drones flying overhead. As prior studies have shown, media exposure may elicit immediate emotional reactions that circulate through networked publics, including empathy for those affected (e.g., Ferrara and Yang, 2015; Fischer et al., 2011; Maier et al., 2017; Papacharissi, 2016). However, such reactions tend to be fleeting, especially when replaced by other emotional arousals from emerging attention-grabbing content (Ferrara and Yang, 2015).

As of 2025, several wars have persisted for over a decade. Yet, those wars have gradually faded from public attention, despite the critical situation. For example, the Syrian Civil War, which has been ongoing for 15 years and where the violence is still escalating, is referred to as the "forgotten war" (Chawaf, 2023; Schlein, 2024). Should this perceptual dynamic of declining public attention be understood simply as a result of forgetfulness? Or could it reflect a broader emotional disengagement, where people no longer respond to such events? These questions call for deeper investigation into the underlying mechanisms of this phenomenon, as public awareness and sustained attention are essential for keeping such issues on the global agenda, encouraging civic engagement and donations, and ultimately supporting efforts toward conflict resolution (Kataria and Regner, 2015; Mavrodieva et al., 2019; Nwanmuoh et al., 2021).

Guided by this inquiry, the present study examines potential indicators of public-level desensitization in the context of the Russia-Ukraine war by analyzing how news coverage reflects

a shift in public sentiment and the use of moral language. The study is grounded in agenda-setting theory and draws on Herbst's (2001) argument that the news agenda reflects public priorities and thus serves as a valuable societal artifact through which public opinion can be linguistically examined. Additionally, it posits that desensitization is closely linked to a decline in empathy, which may be reflected in a decreasing use of moral language over time. To assess these two dimensions of desensitization, sentiment and moral expression, the study employs dictionary-based content analysis, incorporating the Lexicoder Sentiment Dictionary (LSD) and the extended Moral Foundations Dictionary (eMFD). Accordingly, the study is guided by the following research question: How does news coverage of the Russia-Ukraine war reflect public-level desensitization to violence over time?

While previous research has examined desensitization at the individual level, particularly in the context of violent video games (e.g., Arriaga et al., 2015; Carnagey, 2007), there is limited scholarship that sheds light on desensitization to real-world violence and war at the public level. As of February 2025, the Russia-Ukraine war has entered its third year, underscoring its relevance as a case for investigation. Yet, the war's significance has diminished in public attention, partially due to the emergence of other global conflict and the passage of time. The present study aims to contribute to the theoretical discussion on public-level desensitization through sentiment analysis and to enhance understanding the relationship between (prolonged) war and public opinion. Additionally, by analyzing how language in news coverage reflects emotion and morality, this study offers methodological insights that may inform future research.

1 Literature Review

1.1 News Agenda and Public Opinion

Agenda-setting theory attributes significant influence to the news media in shaping consensus about the most important problems of the day (McCombs, 1997). The "agenda" refers to an object with various attributes or characteristics that describe it. The news emphasizes particular attributes of an agenda, making them more salient than others and guiding people to perceive salient issues of most significant importance (McCombs and Shaw, 2005). Over time, patterns of salience come to reflect a considerable degree of community priorities (McCombs, 1997). The agenda-setting effects are also cumulative, resulting from consistent media coverage and other factors affecting the relationship between the public and the media (Fetoshi and Gërguri, 2023). McCombs and Show (2005) suggested that these cumulative effects are cognitive and affective, influencing people's thoughts and feelings about the issues.

As journalism inherently serves the public interest in a democratic society, agenda-setting theory concerns how news shapes the public as a collective body rather than focusing on individual-level opinion (Christians, 2009; Hanitzsch and Vos, 2018). Public opinion is a social product of communication, which emerges through a process of collective engagement where individuals discuss and react to various issues with the communicative interplay through multiple media (Binkley, 1927). The opinions are "public" in the sense that they are "shared, have their currency and use, but not equally with reference to all problems" (Binkley, 1927: 391). In light of this, agenda-setting theory captures the media's capacity to affect the shared opinion on a particular issue through communication.

Prior works have primarily focused on news as an exogenous influence on the formation of public opinion (e.g., Gamson and Modigliani, 1989). Iyengar and Simon (1993) found that news coverage of the Gulf crisis significantly influenced public opinion. Similarly, findings by Dunaway et al. (2010) reported that the American public perceived immigration as an important issue following the increased news coverage. A study by Fetoshi and Gërguri (2023) also indicated that the media agenda on the Russia-Ukraine war translated into Kosovo's public agenda, influencing how the public viewed the conflict.

Recently, the agenda-setting process has become more complex with the emergence of new communication channels, which challenge the agenda-setting power of the traditional media (Luo, 2014; Neuman et al., 2014). For instance, Boynton and Richardson (2016) found that social media has enabled the public to shape the news agenda by disseminating ideas through large-scale communication. A study by Su and Borah (2019) also suggested that discussion in the Twittersphere influenced newspapers' agendas, particularly regarding breaking news. These dynamic interactions between traditional media, social media, and mass audiences imply that news nowadays is more reflective of public opinion (Wlezien and Soroka, 2024).

McCombs (1997) added that agenda-setting is not a linear, one-way process but a reciprocal interaction. He identified two approaches: the top-down agenda-setting, where public consensus originates within news outlets, and the bottom-up (reversed) agenda-setting, where public opinion polling identifies salient issues that journalists then report based on the audience's concerns. This bottom-up process empowers the public by giving them a voice and introducing new dimensions to the news agenda. Similarly, Herbst (2001: 454) reinforced this idea, stating that "journalists live in our world, are part of the public, and, since they do not live in a vacuum, have

a sense of public opinion while they compile broadcasts." Using the (bottom-up) agenda-setting theory as a theoretical basis, this study assumes that news reflects public opinion.

According to Herbst (2001), it is important to start with available data (e.g., news coverage) – which she calls "artifacts" – and work backward to uncover what public opinion is and how it is embedded. This backward approach from content and discourse analyses provides a richer examination of public opinion than traditional assessment tools like polls. Polls and surveys often treat public opinion as a fixed entity with a clear definition, disregarding the cultural context in which it is formed. However, public opinion is inherently nebulous and constantly evolving. Accordingly, the backward approach offers the most comprehensive way to study public opinion, "always keeping in mind that it is a culturally situated entity" (Herbst, 2001: 455).

Building on this perspective, this study incorporates sentiment analysis to understand public opinion. Sentiment – comprising moods, emotions, feelings, and evaluations – is critical to analyzing public opinion (Huh and Park, 2024; Kochuieva et al., 2021). Sentiment analysis, often referred to as opinion mining, is a computational method used to investigate polarity and opinionated information in text (Giachanou and Crestani, 2016). For this reason, sentiment analysis of news coverage can provide insights into the "embeddedness" of public opinion within the context of the Russia-Ukraine war, a conflict of international relevance.

1.2 Desensitization and Group Emotion

Emotions are "socially recognized, structured episodes of affectively valenced response" (Hall and Ross, 2015: 849). This definition implies that emotions are socially constructed experiences with meanings, occurring in structured patterns shaped by social contexts and carrying a positive or negative valence. Campbell et al. (2014) defined desensitization as a general psychological process

in which specific emotional responses (e.g., shock, fear) become less intense over time with repeated exposure. These conceptualizations align, highlighting key aspects of desensitization: (1) it is an incremental process, (2) it requires interaction with a stimulus, and (3) it involves the modulation of emotional responses. These aspects are applicable considerations in studying desensitization.

The concept of desensitization is rooted in Wolpe (1968), who developed a behavioral therapy technique called systematic desensitization. This technique exposes individuals to progressively stronger fear-evoking stimuli until they are desensitized to the most aversive one. Over decades, systematic desensitization has been proven effective in treating people with phobias and fear-related disorders (Triscari et al., 2015). More recently, desensitization has been studied across a range of scientific fields, including health sciences (e.g., Marco-Martin et al., 2020), political psychology (e.g., Abuín-Vences et al., 2022), and media and communication studies (e.g., De Choudhury et al., 2015; Fanti et al., 2009).

The distinction between desensitization and fatigue is often blurred, as both concepts describe the effects of prolonged exposure to a stimulus. Specifically, both involve emotional changes from the temporal massing of stimuli (Watts, 1979). Due to this conceptual overlap, some studies suggest that desensitization results from fatigue, while others propose the reverse (Chen et al., 2023; Pascasio, 2017; So et al., 2017). Additionally, some studies consider fatigue as an umbrella term encompassing desensitization (Kinnick and Krugman, 1996). However, desensitization is distinct from fatigue, although both involve emotional shifts.

Primarily, desensitization and fatigue involve distinct emotional processes. In understanding desensitization, the habituation model remains a theoretical framework. This model posits that desensitization is a habituation rather than an extinction process. While habituation

explains a decline in unconditioned (automatic) responses after repeated exposure, extinction accounts for a decline in conditioned (learned) responses (Watts, 1979). The presence of a habituation process distinguishes desensitization from fatigue (Watts, 1979). This means that desensitization occurs mainly due to repeated exposure, rather than from learning a response.

Furthermore, desensitization and fatigue lead to different emotional outcomes. While desensitization refers to decreased emotional responsivity, fatigue is more closely associated with emotional exhaustion (Figley, 2013; So et al., 2017). This distinction explains why researchers often use the term burnout when discussing fatigue (Figley, 2013; Kinnick and Krugman, 1996). For instance, Figley (2013) describes compassion fatigue as a form of burnout, encompassing outcomes associated with emotional exhaustion. In their conceptualization of message fatigue, So et al. (2017: 10) define it as "an aversive motivational state of being exhausted and bored." Therefore, desensitization involves a gradual, passive decline in emotional responsiveness, whereas fatigue leads to a more active disengagement driven by exhaustion or boredom.

Previous studies have further explored the mechanisms that trigger desensitization. From a neurodevelopmental perspective, the brain adapts patterns, learning how to respond to them (Perry, 2002). Individuals may stop reacting emotionally after repeated exposure to morally distressing situations, because their brains have adapted to how they respond to such situation (Funk, 2003). This finding aligns with Seu's (2003) research, which suggests that overexposure can trigger desensitization. According to Seu (2003), the public is repeatedly confronted with the same information until they become immune to it. Additionally, desensitization serves as a defense mechanism for self-protection against traumatic experiences (Brockmyer, 2022). However, it may normalize violence, making it an ordinary part of life (Kennedy et al., 2016; Sypher et al., 2019).

While much of the literature focuses on individual responses, desensitization also occurs within social contexts, where collective patterns of emotional disengagement can emerge. When individuals repeatedly disengage emotionally from shared experiences, this can give rise to common emotional patterns among groups that share similar activities, identities, or interests (Menges and Kilduff, 2015). This process aligns with the concept of group emotion, which develops when emotions are formed and expressed collectively. Such emotions influence not only how individuals feel about their own group (ingroup) but also how they respond emotionally to others (outgroup) (Menges and Kilduff, 2015). This perspective is relevant to the Russia-Ukraine war, where group emotions may develop even among those outside the conflict zone, shaped by media coverage, political discourse, and social interactions.

Recent research has explored how sentiment analysis reflects the desensitization in text. De Choudhury et al. (2015) examined changes in people's negative emotions during the Mexican drug war as reflected on Twitter, utilizing the Linguistic Inquiry and Word Count (LIWC) dictionary and the Affective Norms for English Words (ANEW) dictionary. Likewise, Li et al. (2017) used LIWC to analyze sadness, anger, disgust, fear, and anxiety towards gun violence. Their findings indicated a decrease in overall negative emotions but an increase in anxiety over time. This suggests that people become less sensitive to specific stimuli while they increasingly experience tension about gun violence.

Stevens et al. (2021) similarly used LIWC to measure tweet anxiety during the COVID-19 pandemic. They concluded that desensitization explains their findings, as anxiety levels in tweets increased only in the early stages of the pandemic. Jeong et al. (2023) integrated the Bidirectional Encoder Representations from Transformers (BERT) model and found that the declining trend of anxiety in tweets could be attributed to desensitization during the pandemic.

Sentiment analysis, which classifies the emotional valence of text, is a helpful method for studying desensitization beyond the individual level, as it captures the emotional patterns embedded in textual data over time. Although the method typically analyzes individual tweets, these can reflect aggregated emotional trends when examined at scale. However, interpreting individual-level expressions as indicative of public-level emotion requires a stronger theoretical grounding to justify such aggregation.

To the author's knowledge, there is limited scholarly work examining desensitization through sentiment analysis of news articles. This study conceptualizes desensitization as a group emotion phenomenon that emerges among individuals not directly affected by the war (Joye, 2015). By integrating agenda-setting theory with the concept of group emotion, this study proposes that sentiment analysis of news articles can reveal how news coverage reflects the presence – or absence – of public-level desensitization. To understand this dynamic, this study is guided by the following research question and the hypothesis (H1):

RQ: How does news coverage of the Russia-Ukraine war reflect public-level desensitization to violence over time?

H1: News sentiment becomes less negative over time, suggesting public-level desensitization to the Russia-Ukraine war violence.

1.3 Emotional Tone in Journalism

"Objective reporting is supposed to be cool, rather than emotional" (Schudson, 2001: 150). The objectivity norm in journalistic practice emphasizes reporting facts rather than values (Shudson, 2001). It reflects a commitment to detachment, impartiality, and professional distance in journalism (Kotisova, 2020). Objectivity is regarded as a moral ideal of reporting and editing

practices and a core occupational value of journalism (Schudson, 2001). In contrast, deviations from the traditional objective style have long been characterized as "emotional" and, consequently, as indicators of unprincipled, flawed, sensational, biased, or bad journalism (Beckett and Deuze, 2016; Peters, 2011). However, this binary contrast between objectivity and emotion overlooks that news has always been emotional (Peters, 2011).

Scholars increasingly recognize that emotion is an integral part of journalism, influencing both how news is framed and how audiences receive it (Pantti, 2010; Goutier et al., 2021; Yaméogo et al., 2024). Emotion informs audiences and enhances their engagement and retention by making stories more relatable (Gürsel, 2016; Peter, 2011). Additionally, emotion mobilizes audiences to create solidarity communities and adopt certain positions (Wahl-Jorgensen and Pantti, 2021). Knight (2020) argues that emotionality is no longer an adversary but a support to journalistic professionalism. Notably, following the events of September 11, emotion became more widely embraced and amplified within the journalistic culture (Tumber and Prentoulis, 2003).

Peters (2011) explains that while news is inherently emotional, emotional styles have become more diverse and explicit, incorporating personal narratives and visual and auditory cues that evoke emotions. This development has accelerated in today's media landscape, where news is mobile and personalized. The intense organizational competition has led to the strategic use of emotion to capture the audience's attention (Beckett and Deuze, 2016). Research shows that emotional cues in news content contribute to its virality (Berger and Milkman, 2012). Emotionally charged news appeals to audiences seeking emotional resonance (Beckett and Deuze, 2016).

Changes in the media landscape have also influenced journalists' use of emotional expression in news storytelling. The integration of emotions reflects how journalists perceive their audiences (Peters, 2011). A study by Pantti (2010) revealed that journalists widely acknowledge

the role of emotion in facilitating the understanding of the news. They view the presentation of relevant collective emotions as an integral part of conveying facts (Pantti, 2010). In social justice journalism, which aims to drive social change, journalists often use the emotions of the people they cover to inspire audiences to take action (Steinke and Belair-Gagnon, 2020). Emotion is also particularly evident in war reporting, where journalists aim to grab the sentiment of their audiences (Stupart, 2021; Tumber and Prentoulis, 2003).

At the same time, it is important to note that news organizations still strive to be perceived as objective. Journalists often avoid using explicit emotional language but instead employ complex discourse structures or quote others expressing their emotions (Balahur et al., 2013). Analyzing Pulitzer Prize-winning articles from 1995 to 2011, Wahl-Jorgensen (2013) found that journalists rarely express their own emotions but frequently depict the emotions of individuals, groups, and collectives – predominantly negative and often reflective of the journalists' own emotions. To foster emotional engagement with audiences, journalists also rely on personalized storytelling and anecdotal leads (Wahl-Jorgensen, 2013). This suggests that while news conveys emotions, it does so through a complex dynamic in texts. Therefore, while emotional expression in news may be indirect, it remains accessible through textual analysis.

1.4 Care/Harm and Desensitization

Morality refers to the codes of conduct that guide how a group treats others, including fairness and justice (Atari and Dehghani, 2022). Scholars argue that morality is both an innate and evolved feature of human nature, shaped through life in complex social environments (Atari and Dehghani, 2022; Haidt and Joseph, 2004). Moral intuitions are key in guiding human behavior and decision-making processes, including group formation, voting, and public opinion (Graham et al., 2009;

Morgan et al. 2010; Strimling et al., 2019). Given their motivational power, studying moral intuitions is of societal importance, as it reveals how moral judgements emerge across various issues (Hopp et al., 2021).

According to Moral Foundations Theory (MFT), morality is grounded in five foundations that reflect universal, cultural, and evolutionary aspects of moral reasoning: care/harm, fairness/reciprocity, ingroup/loyalty, authority/respect, and purity/sanctity (Haidt and Joseph, 2004). First, the care/harm foundation involves moral judgements relating to compassion and protecting others from suffering. Second, the fairness/reciprocity foundation concerns relationship and cooperation based on justice. Third, the ingroup/loyalty foundation reflects the value of allegiance to one's in-group. Fourth, the authority/respect foundation pertains to respect for legitimate authority and traditions. Fifth, the purity/sanctity foundation involves moral concerns about impure and dirty behavior, often rooted in religious ideals (Haidt and Joseph, 2004). In MFT, each foundation is associated with virtues (moral ideals) and vices (moral violations) (Hopp et al., 2021). For example, the care/harm foundation values virtues of compassion and empathy, while discouraging vices like indifference and cruelty to suffering.

Five foundations are further grouped into two broader categories based on their psychological function (Graham et al., 2009). Individualizing foundations – care/harm and fairness/reciprocity – focus on individual rights, autonomy, and fair treatment of others. In contrast, binding foundations – ingroup/loyalty, authority/respect, and purity/sanctity – emphasize group cohesion and adherence to shared values and traditions (Atari and Dehghani, 2022). This distinction helps explain why individuals differ in what they perceive as morally relevant. For some, maintaining social order may be more important than contemplating the complex issues

such as human rights and international justice (Dawson et al., 2023). In some cases, endorsing the binding foundations may justify immoral behavior towards others (Smith et al., 2014).

Previous research has explored individual differences in the endorsement of moral foundations. Individuals who endorse individualizing foundations are generally more likely to engage in prosocial behaviors over group cohesion. For example, they are more inclined to donate to charitable causes and report online hate speech than those prioritizing binding foundations (Nilsson et al., 2020; Wilhelm and Joeckel, 2019). Moral foundation endorsement is also found to have a link to political orientation. While liberals relied more on individualizing foundations, conservatives endorsed both individualizing and binding foundations more evenly (Graham et al., 2009; Haidt and Graham, 2007). Similar partisan difference was observed in a news framing analysis by Hopp et al. (2021). The study found that *The Huffington Post* (far-left) emphasized the individualizing foundations, whereas *Breitbart* (far-right) focused more heavily on the ingroup/loyalty and authority/respect foundations.

In light of the ideological differences in moral foundation endorsement, studies have examined the psychological motives of these orientations. Importantly, Strupp-Levitsky et al. (2020) argue that while binding foundations are associated with epistemic and existential motives aimed at reducing uncertainty, individualizing foundations are more strongly linked to empathic motives than to epistemic or existential ones. Empathy has been empirically associated with individualizing foundations (Dawson et al., 2023). More recently, Park and Ishii (2024) found that the care/harm foundation is positively associated with empathic concern, a central component of empathy.

Building on these findings, the present study proposes that the care/harm foundation can be meaningfully used to operationalize empathy in studying desensitization. As Funk et al. (2003)

argue, empathy is a key component of the moral reasoning process, and its absence can be indicative of desensitization. Empathy activates the moral reasoning that guides prosocial behavior, whereas a lack of empathy can block this process (Marsh, 2014). Early research also found that lower levels of empathy predict greater desensitization (Anderson et al., 2010; Funk et al., 2003; Wei, 2007).

Given its capacity to capture moral foundations, Language is a cost-effective medium through which humans "depict, codify, and create" moral values (Atari and Dehghani, 2022: 207). When individuals take or advocate a moral stance, their language becomes morally expressive (Atari and Dehghani, 2022; Sagi and Dehghani, 2014). Accordingly, Levy (2006: 99) argues that morally relevant information in text is a "community-wide and distributed enterprise," suggesting that moral language is not produced by isolated individuals, but shaped collectively by various sources and contexts. Therefore, the care/harm foundation, in particular, can be empirically examined through textual analysis. Informed by literature, the present study proposes that the use of care/harm moral language over time may reflect "community-wide" empathic engagement, offering a linguistic marker of desensitization.

Specifically, this study uses the extended Moral Foundations Dictionary (eMFD) to examine changes in the use of language associated with the care/harm foundation, which reflects empathic concern. By observing how the salience of care/harm language evolves in reporting on the Russia-Ukraine war, the study investigates whether a decline in this moral language may serve as a linguistic marker of diminishing empathy. Therefore, the study proposes the second hypothesis (H2):

> **H2:** There is a decline in care/harm score in news articles about the Russia-Ukraine war over time, indicating reduced empathy.

3 Method

3.1 Data Collection

This study analyzed news articles that reflect public discourse on violence in the context of the Russia-Ukraine war. Drawing on the World Health Organization's definition, violence is understood as "the intentional use of physical force or power" that results in, or is likely to result in, "injury, death, psychological harm, maldevelopment, or deprivation" (World Health Organization, n.d.). To be included, an article must focus on or centrally discuss at least one of the following dimensions: (1) military activity (e.g., drone strikes, information warfare), (2) civilian impact (e.g., death, psychological trauma), (3) violations of international humanitarian law (e.g., war crimes), or (4) direct consequences of violence (e.g., forced displacement). Articles that only mention the war in passing or primarily address its indirect effects, such as diplomatic developments or economic consequences (e.g., the energy crisis), were excluded from the analysis.

The study used Lexis Uni as a database to compile news articles from *The Independent*, *The Times*, and *The Daily Telegraph*, using a Boolean search query:

> (aggression OR crimes OR genocide OR offensive OR occupation OR battlefield OR bombs OR soldiers OR airstrike OR attack OR missile OR bombardment OR troops OR kill OR civilians OR killed OR unarmed OR dead OR death OR died OR survivors OR children OR women OR grave OR bodies OR injured OR casualties OR humanitarian OR refugees OR refugee) AND Ukraine AND Russia AND war

The selected timeframe ranged from February 24, 2022, the onset of the Russia-Ukraine war, to December 24, 2024. This 35-month timeframe allows an analysis of how public sentiment evolves, including shifts that may occur following the outbreak of the Israel-Hamas war in October 2024.

After the data collection, the data were loaded in R (R Core Team, 2024), using the LexisNexisTools and readtext packages. The study inspected whether articles were exact duplicates by comparing (1) the full article text and (2) normalized versions of the articles (standardized for punctuation, spacing, and casing). In cases of exact matches, only one version was retained. However, the study also identified near-duplicate articles with only minor variations that normalization could not detect. To address this, articles sharing the same first 10 words were treated as near-duplicates, and only one version was retained.

A keyword-based dictionary was developed to ensure the retrieved articles aligned with the study's research focus (see Appendix A). Articles containing fewer relevant keywords than a predefined threshold were excluded from the dataset. The dictionary was manually validated using a sample of 450 news articles (recall = 0.65, precision = 0.83, F1 = 0.72). This process retained a total of 13,147 articles.

3.2 Dictionary-based Analysis

3.2.1 Study 1: Lexicoder Sentiment Dictionary (LSD)

The study incorporated the LSD developed by Young and Soroka (2012). The LSD is a bag-of-words dictionary containing 2,858 negative words, 1,709 positive words, and 3,581 negated phrases with positive or negative sentiment. Its size was deliberately calibrated to ensure

discriminative capacity. The LSD is particularly well-suited for this study, as it was designed to analyze large-scale news content analysis. The dictionary's developers provided the LSD preprocessing R script, which consists of four main steps: (1) standardizing or removing punctuation, (2) removing capitalized words (i.e., proper nouns, which are assumed to be non-tonal), (3) standardizing commonly used negation phrases (e.g., converting "not very" to "not"), and (4) removing false hits (e.g., converting "on balance" to "on xbalance").

Before applying the LSD preprocessing functions, the data was cleaned by removing boilerplate texts, Twitter handles, and URLs, as these elements could potentially exaggerate the findings of the main study. The same cleaning step was repeated in Study 2.

The LSD is operationalized in this study to measure news sentiment, defined as "emotions expressed in a news article" (Chan et al., 2021: 4). Following the LSD codebook provided by its developers, the present study calculated the net tone of each article (hereafter referred to as news sentiment) by considering the frequency of positive words, negative words, and their negated forms. Specifically, the total number of positive words is computed by subtracting the number of negated positive phrases and adding the number of negated negative phrases to the raw count of positive words. Conversely, the total number of negative words is computed by subtracting the number of negated negative phrases and adding the number of negated positive phrases to the raw count of negative words. The news sentiment is then calculated by subtracting the total number of negative words from the total number of positive words, and dividing the results by the total number of tokens in the article. The detailed calculation is as follows (see Equation 1):

Equation 1: Calculation of News Sentiment

P - number of positive words

N - number of negative words

NegP - number of negated positive phrases

NegN - number of negated negative phrases

T - total number of tokens

$$\text{Total Positive} = \text{P} - \text{NegP} + \text{NegN} \quad (1)$$

$$\text{Total Negative} = \text{N} - \text{NegN} + \text{NegP} \quad (2)$$

$$\text{News Sentiment (Net Tone)} = \frac{\text{Total Positive} - \text{Total Negative}}{\text{T}} \quad (3)$$

The statistical analysis was conducted using R packages, dply, lubridate, ggplot2, lmtest, stringr, and quanteda.

3.2.2 Study 2: Extended Moral Foundations Dictionary (eMFD)

The second part of the study employed the eMFD, developed by Hopp et al. (2021). Grounded in MFT, the eMFD is designed to extract and analyze moral content in textual data. It comprises 3,270 words, each associated with a vector of five values representing the five moral foundations. These values range from 0 to 1, representing the probability that a given word is linked to a specific moral foundation (Hopp et al., 2021). The eMFD is well-suited for the present study, as it was developed using news articles and is intended for large-scale, document-level text analysis.

Following the developers' guidelines, the articles were preprocessed through stop-word removal, tokenization, and lowercasing. The processed text was then compared with the care/harm dimension scores from the eMFD. Each time a word matched the dictionary, its associated probability score was stored. These scores were subsequently averaged and multiplied by 100 to produce a normalized care/harm score (see Equation 2). The analysis was done using R packages used in the Study 1.

Equation 2: Calculation of Care/Harm Score

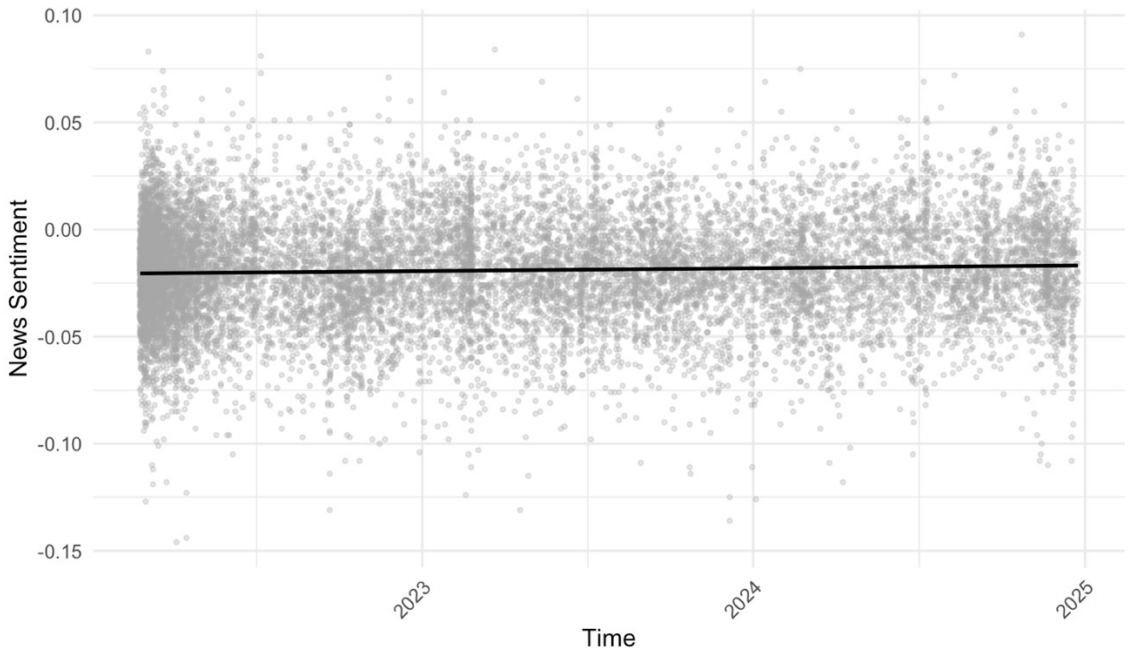
$$\text{Care/Harm score} = \left(\frac{\text{Total Care/Harm Scores}}{\text{Number of Tokens}}\right) \times 100$$

4 Results

4.1 Study 1: Examining Shift in News Sentiment

To address the H1, a linear regression was conducted to examine the trend in news sentiment from February 24, 2022, to December 24, 2024. The results suggest that the overall sentiment of news articles became less negative over time (b = 0.000004, SE = 0.0000007, $p < .001$), with 0.2% of the variance explained (R^2 = .002). This means that, on average, news sentiment increased by 0.000004 units per day. The mean news sentiment was -0.02 (SD = 0.02) (see Figure 1).

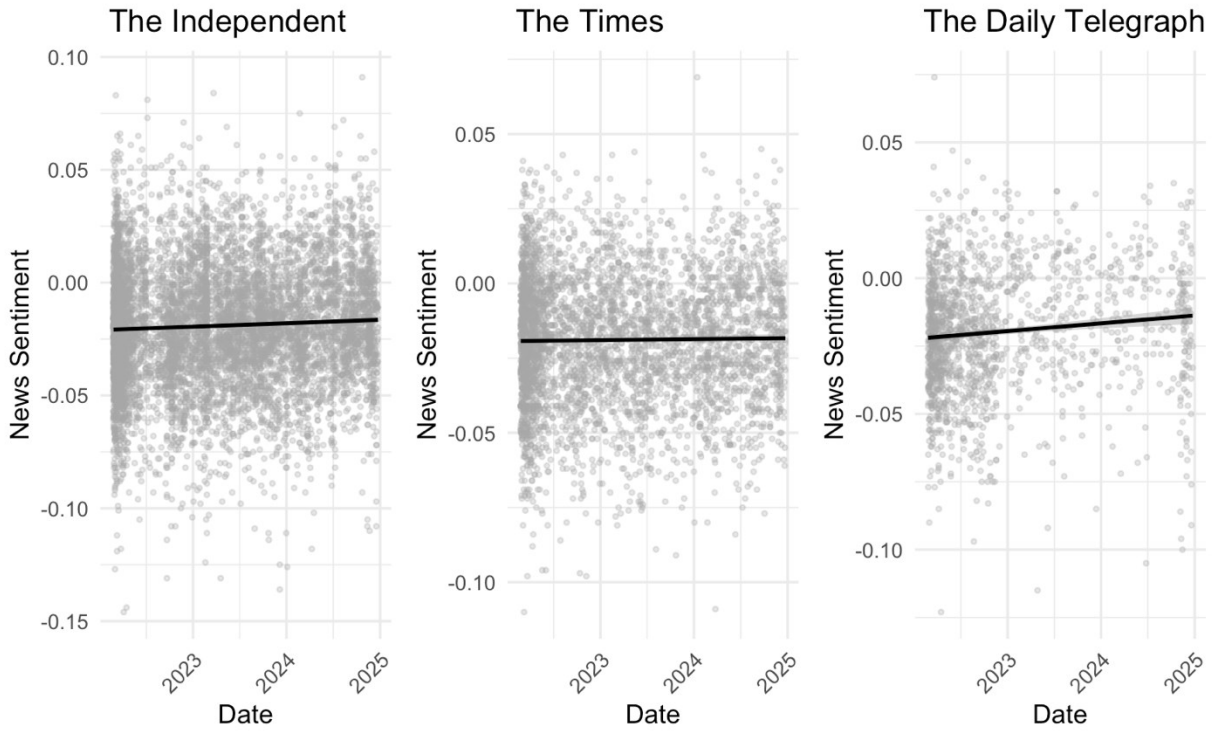
Figure 1. Linear Trend in News Sentiment Over Time



The data were analyzed separately by news source to explore potential outlet-level differences. The results revealed a statistically significant positive trend in articles published by *The Independent* (b = 0.000004, SE = 0.000001, $p < .001$, R^2 = .003; see Figure 2) and *The Daily*

Telegraph (b = 0.000008, SE = 0.000002, p < .001, R^2 = .01; see Figure 2). No significant trend was observed in articles published by *The Times* (b = 0.000001, SE = 0.0000001, p = 0.39, R^2 = .0002; see Figure 2). While *The Independent* and *The Daily Telegraph* trends were statistically significant, their effect sizes were extremely small, and the proportions of explained variance were also minimal. This implies that the relationship between time and news sentiment is weak and may have limited practical significance.

Figure 2. Linear Trend in Monthly Mean News Sentiment



To minimize potential noise from daily fluctuations, the outlet-level trends were further examined using the monthly means. Similarly, a positive and significant trend was observed in articles published by *The Independent* (b = 0.002, SE = 0.0008, p < .001, R^2 = 0.09), with a mean news sentiment of -0.02 (SD = 0.004). However, a Breusch-Pagan test revealed heteroskedasticity

in the model ($p < .05$; see Appendix B). Therefore, the reported standard error and p-value may be less reliable. Trends were not statistically significant for articles published by *The Times* ($b = 0.0007$, $SE = 0.0007$, $p = .33$, $R^2 < .001$) or *The Daily Telegraph* ($b = 0.003$, $SE = 0.001$, $p = .07$, $R^2 = .07$). Additionally, a Shapiro-Wilk test indicated that residuals for *The Daily Telegraph* deviated from normality ($p < .05$; see Appendix C).

An interaction analysis was conducted to investigate whether the temporal trend in sentiment varied according to the severity of violence. The study tested whether the number of Ukrainians killed by the war moderated the relationship between time and news sentiment. Results revealed a significant interaction effect in articles published by *The Independent* ($b = 0.00003$, $SE = 0.00001$, $p < .05$). The model accounted for 22% of the variance in news sentiment ($R^2 = .22$), suggesting considerable explanatory power. However, no significant moderation effect was found in articles published by *The Times* ($b = 0.000003$, $SE = 0.00001$, $p = .76$, $R^2 < .001$) and *The Daily Telegraph* ($b = 0.000007$, $SE = 0.00002$, $p = .71$, $R^2 = .02$).

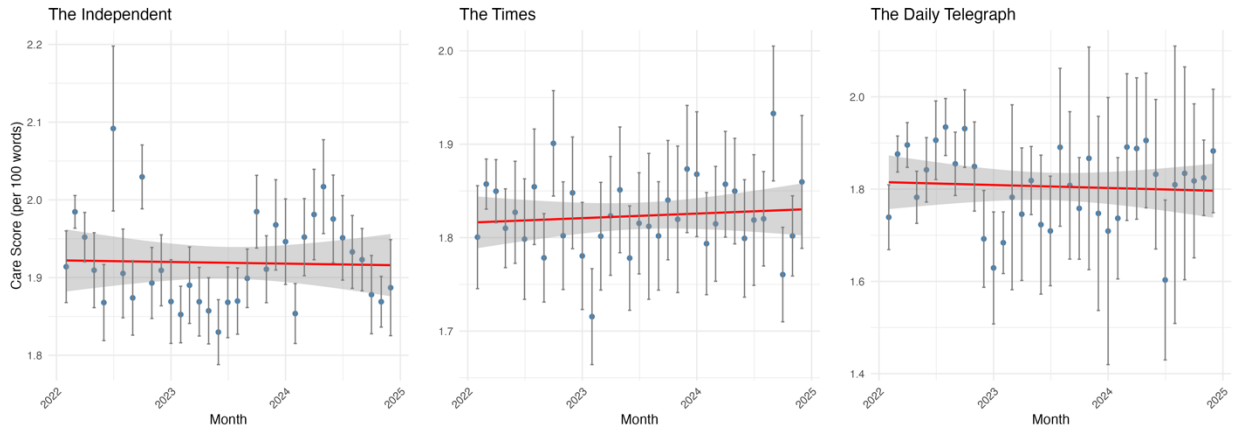
To summarize, while news sentiment becomes less negative over time in the aggregated daily-level analysis, this trend was inconsistent across individual outlets or at the monthly level. The results showed that the trend was significant for *The Independent* across all levels of analysis, but not for *The Times* or *The Daily Telegraph*. Therefore, the first hypothesis is only partially supported by the findings.

4.2 Study 2: Examining Changes in Care/Harm Moral Language

A linear regression was conducted to investigate changes in the use of care/harm moral language over time. The results revealed no statistically significant trends across all three news outlets. Specifically, a negative but non-significant trend was observed in articles published by *The*

Independent (b = -0.002, SE = 0.01, p = .86, R^2 < .001; see Figure 3) and *The Daily Telegraph* (b = -0.006, SE = 0.02, p = .71, R^2 < .001; see Figure 3). Additionally, the Durbin-Watson test detected the presence of autocorrelation in *The Daily Telegraph* model (p < 0.01; see Appendix D). In articles published by *The Times*, a positive but non-significant trend was found (b = 0.005, SE = 0.008, p = .56, R^2 < .001; see Figure 3). The Shapiro-Wilk test for this model yielded a significant result (p < .05; see Appendix E), suggesting that the residuals deviate from normality. Notably, each of the three models explained less than 0.1% of the variance, indicating that the use of care/harm moral language does not appear to be meaningfully related to time.

Figure 3. Linear Trend in Monthly Mean Care/Harm Score



Additionally, linear regression analyses were repeated with the same model after removing outliers based on the upper and lower quartile tails to account for potential within-month variability. Again, none of the models yielded statistically significant results.

Using the initial model (without removing outliers), interaction analyses were conducted to examine whether the use of care/harm language over time was moderated by the severity of war violence, measured by the monthly number of Ukrainians killed. The results revealed no

statistically significant interaction effects across news outlets. For *The Independent* (b = 0.0001, SE = 0.0002, p = .53, $R^2 < .001$); for *The Times* (b = 0.00004, SE = 0.0001, p = .72, $R^2 < .001$); and for *The Daily Telegraph* (b = -0.0002, SE = 0.0002, p = .48, $R^2 < .001$).

In conclusion, the second hypothesis is rejected as the model revealed no statistically significant relationship.

5 Discussion

The desensitization phenomenon is a double-edged sword. While it protects individuals from psychological distress caused by traumatic experiences, it also contributes to the perceptual normalization of violence. In this context, war may come to be perceived as an ordinary part of life by audiences, particularly those exposed to it indirectly and repeatedly through media. Examining the consequences of desensitization is both critical and socially significant, as it can reduce individuals' empathy for war victims and impede moral reasoning processes when confronted with severe wars (Funk et al., 2003; Krahé et al., 2011). Subsequently, the present study investigated desensitization in the context of the Russia-Ukraine war, which has continued since its outbreak in early 2022.

Previous studies have examined desensitization using sentiment analysis of textual data (De Choudhury et al., 2015; Li et al., 2017; Stevens et al., 2021). These studies have primarily relied on social media data to study desensitization as the aggregation of individual emotional responses over time. While this approach can capture nuanced, user-generated emotional expressions, it also presents a key limitation: the heterogeneity of users. Since the source of emotion varies constantly across posts and time, the aggregated level of emotional valence cannot be reliably interpreted as more than the sum of individual emotional responses. In other words, the trend is measured, but the sample changes continuously. This makes it challenging to capture the incremental nature of desensitization (see Section 1.2). On the other hand, experimental or survey-based studies often cannot account for contextual variables that may influence individuals' desensitization in everyday life or beyond the physiological level (Brockmyer, 2022; Seu, 2003).

To account for these challenges, this study shifted its focus to public-level desensitization. While individual-level desensitization refers to psychological habituation to violence, examining

public-level desensitization can reveal broader shifts of public discourse, which are embedded in a "nebulous nature, complex cultural setting, and changeability" (Herbst, 2001: 455; Watts, 1979). Additionally, individual and public desensitization may not unfold in parallel. For example, public discourse may become less affectively charged, even as individuals become more emotionally reactive due to personal experiences. Given this, the present study analyzed news coverage of the Russia-Ukraine war to analyze deeper reporting layers that both shape and are shaped by public sentiment.

In sum, the findings partially support the H1, while the H2 is not supported. The aggregated daily data indicate that news sentiment becomes less negative over time, gradually approaching a neutral point, where the use of negative and positive language in articles appears in roughly equal proportions. Applying agenda-setting theory to this finding suggests that the public becomes emotionally less responsive to the violence over time, and the news agenda reflects this shift in sentiment. However, given the small effect size and low proportion of explained variance, these issues will be addressed in the limitations section.

To further elaborate on this finding, it is plausible that news outlets have adopted different framing strategies over time. For example, in the early stages of the war, coverage may have focused more on war victims' narratives, such as the story of Mia, a Ukrainian woman, who gave birth in a shelter during the bombing of Kyiv (Oppenheim, 2022). Over time, however, the reporting may have shifted toward a more impersonal and statistical framing, exemplified by headlines like "death toll reaches 43,000" (Rai, 2024). This shift aligns with the concept of the identifiable victim effect, which suggests that individuals are more likely to feel empathy when presented with the story of a single identifiable victim than statistical victims (Jenni and Loewenstein, 1997). As Slovic (2007) argues, numerical representations of suffering often fail to

evoke an emotional response. Building on this framework, future research could conduct an in-depth analysis of linguistic styles and framing techniques to better understand how they reflect the desensitization process.

Further analyses with the LSD revealed that the news sentiment trend is inconsistent across news outlets. Specifically, the trend was statistically significant only for *The Independent*, both at the daily and monthly levels. Given that *The Independent* differs ideologically from *The Times* and *The Daily Telegraph*, one might attribute this result to differences in partisan affiliation (see Appendix F). However, prior research has found no systematic differences in affective tone between left- and right-leaning news outlets (Bellovary et al., 2021). Moreover, since this study included only one left-leaning and two right-leaning outlets, it is too hasty to conclude that political orientation is the driving force behind the observed trend. Therefore, this study encourages subsequent studies to investigate whether a news outlet's partisan affiliation meaningfully explains desensitization patterns in war reporting.

The study also examined the moral language usage in the news coverage, specifically focusing on the MFT's care/harm foundation. The findings revealed that the news coverage on the Russia-Ukraine war violence elicited significantly stronger care/harm language than the other foundations, which is consistent with the findings by Hopp et al. (2021) that the care/harm foundation has the strongest correlation with news topics related to killing, wounding, and terror (see Appendix G and H). However, the findings do not support the second hypothesis in explaining the trend of the care/harm usage in news articles over time. This may be because the presence of care/harm language in news articles does not necessarily reflect levels of empathy. Alternatively, the stability in moral language use could be attributed to editorial norms that maintain consistent journalistic practices, regardless of temporal shifts in public sentiment.

6 Limitations

This study also has limitations. First, there is a risk of inflated results due to near-duplicate articles, often arising from journalistic practices like news recycling. While the study attempted to reduce redundancy by retaining only one article when duplicates had the same text or began with the same first 10 words, it was impossible to fully deduplicate articles with minor textual variations. For example, one version used the phrase “ahead of the elections” and spelled out “six-million,” while a later revision phrased it as “in advance of the elections” and write “6M.” Another frequent variation involved changes in temporal references, such as “yesterday” versus “on Wednesday,” despite the rest of the content remaining largely unchanged. These small differences pose challenges for longitudinal sentiment analysis, as each article contributes individually to trend estimation and may therefore skew the results if not properly deduplicated.

Second, while the precision of the keyword-based dictionary used to retrieve relevant articles during the sampling process was satisfactory, the recall was relatively low (see Section 3.1). This means that although the dictionary effectively filtered irrelevant articles, it may have failed to capture some relevant ones that should have been included in the dataset. One possible reason for this issue is using a single standardized dictionary across all news sources that follow different journalistic practices. Future research could consider developing tailored dictionaries for each news outlet to address this limitation to improve accuracy.

Third, the LSD is designed to measure sentiment in text, where sentiment is broadly defined as affect or emotion (Young and Soroka, 2012). The developers use sentiment and tone interchangeably, conceptualizing tone as “the opinions and attitudes of newsmakers” (Young and Soroka, 2012: 214). While this conceptualization captures the emotional dimension relevant to desensitization, the LSD still cannot fully capture the construct of interest of the Russia-Ukraine

war. Sentiment remains abstract and context-dependent, and off-the-shelf dictionaries struggle to catch these nuances (van Atteveldt et al., 2021). Therefore, the use of LSD introduces limitations in measurement validity. To strengthen the analysis, researchers may consider applying more fine-grained sentiment dictionaries that account for distinct psychological categories relevant to war reporting. For instance, a complementary methodological approach using the LIWC tool could enable the tracking of specific emotional dimensions such as anxiety or sadness over time.

Fourth, in addition to the above limitation, the two dictionaries in the study were not manually validated. Van Atteveldt et al. (2012: 123) emphasized that "a human eye is still required to guarantee the validity of measuring sentiment in content analysis." This is because the automated content analysis performs weakly relative to human coders, especially when off-the-shelf dictionaries are adopted without customization (van Atteveldt et al., 2021). Due to this limitation, the present study encourages future studies to validate the dictionary further to strengthen the findings.

Fifth, diagnostic tests indicated that several models violated assumptions, including homoscedasticity, autocorrelation, and normality of residuals, as reported in the results section. However, each model exhibited only one type of violation, and none of the models violated multiple assumptions. Given the large sample size, these issues are not expected to compromise the overall interpretation of the findings critically. Nevertheless, the results should be interpreted with caution. To address these limitations, future research could apply alternative modeling techniques, such as robust standard errors, bootstrapping, or weighted regression (Cerqueira, 2022).

Finally, while textual analysis of news articles provides a comprehensive understanding of how public sentiment is embedded, the analysis does not consider other elements that comprise

news articles, such as photographs and videos. According to Casas and Williams (2022), visual information is becoming more important and frequent in online communication. More importantly, visuals have the power to "evoke, appeal to and generate emotions," which is a relevant strand of research in examining public sentiment (Bleiker, 2015: 876). For this reason, the present research recommends that future studies examine how emotion is embedded and conveyed through multimodal cues in news.

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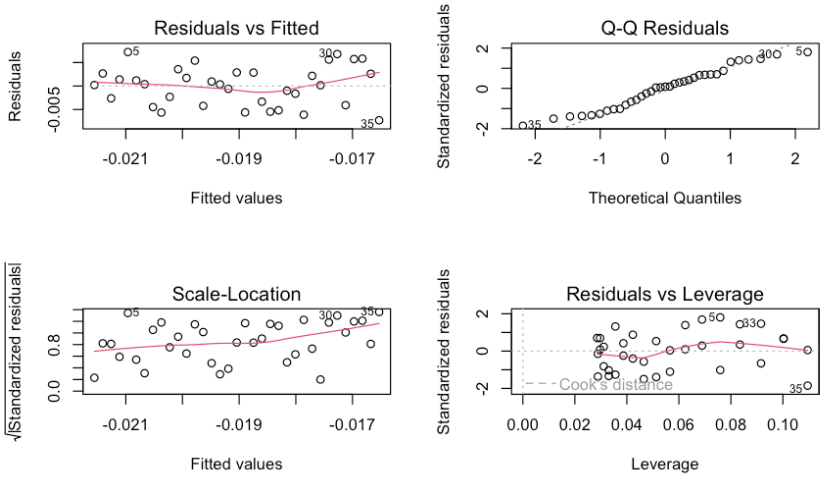
8 Appendix

Appendix A. Keyword-Based Dictionary for Data Inclusion

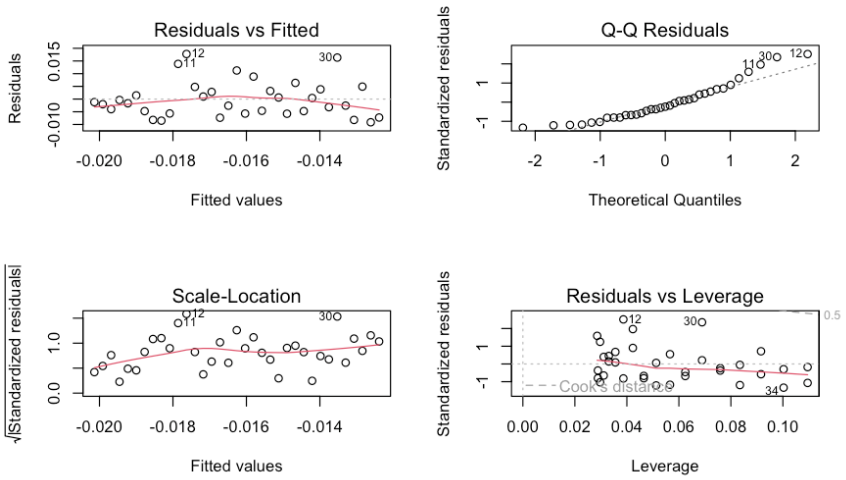
Category	Keyword
Core Conflict Term	ukraine ukrainian russia russian war invasion putin vladimir zelenskyy volodymyr
Weapons & Warfare	troop(s) military weapon(s) missile(s) drone(s) tank(s) airstrike(s) combat misinformation
Death & Injury	death(s) die(d) kill(ed) killing casualty casualties injure(d) injury victim(s) massacre genocide slaughter bombardment

Civilian / Humanitarian Harm	civilian(s) displaced refugee(s) orphan(ed) relief rescue(d) evacuation grief fear torture kidnapped children hospital
Regions (with at least one victim)	sumy bilopillia kharkiv kupiansk kyiv kyiv oblast donetsk toretsk chasiv yar odesa zaporizhzhia kherson oleshky belgorod belgorod oblast

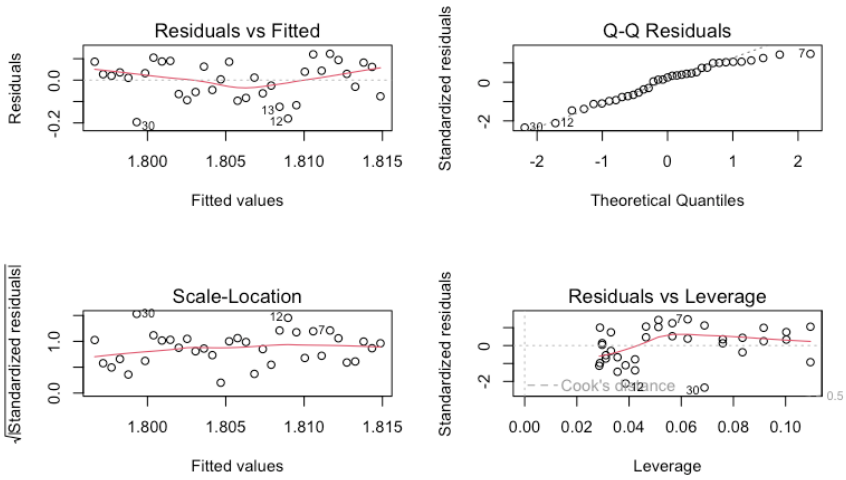
Appendix B. Residual Diagnostic Plots for The Independent Model (Study 1)



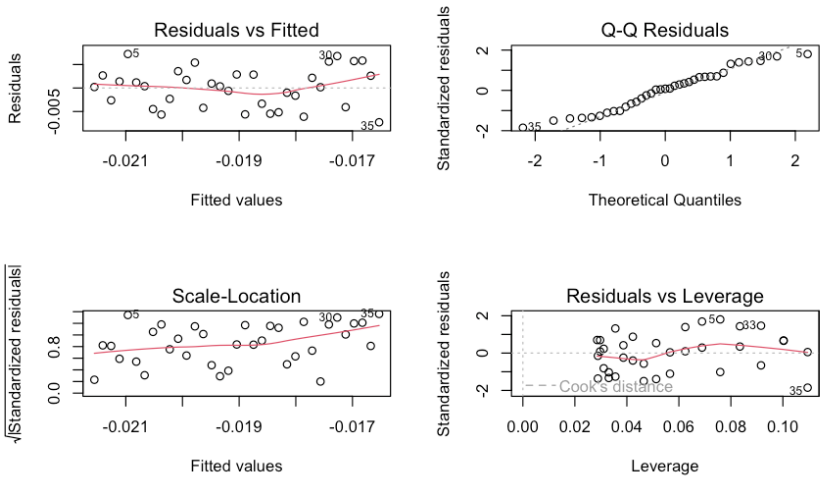
Appendix C. Residual Diagnostic Plots for The Daily Telegraph Model (Study 1)



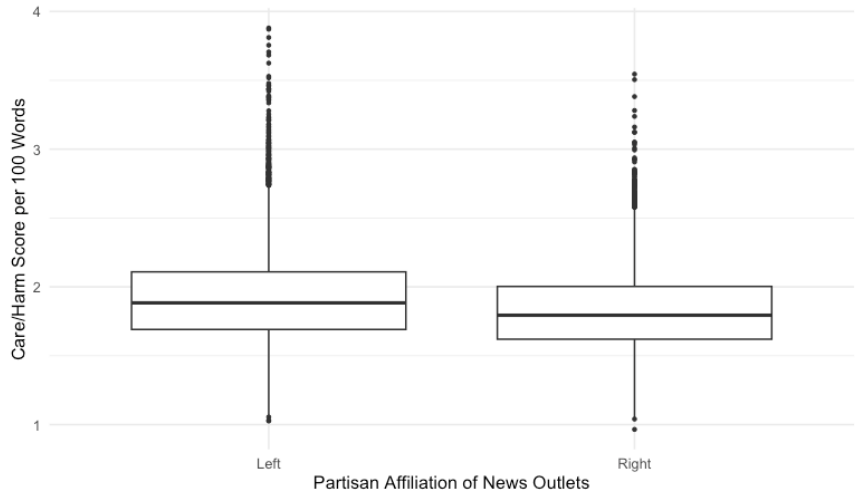
Appendix D. Residual Diagnostic Plots for The Daily Telegraph Model (Study 2)



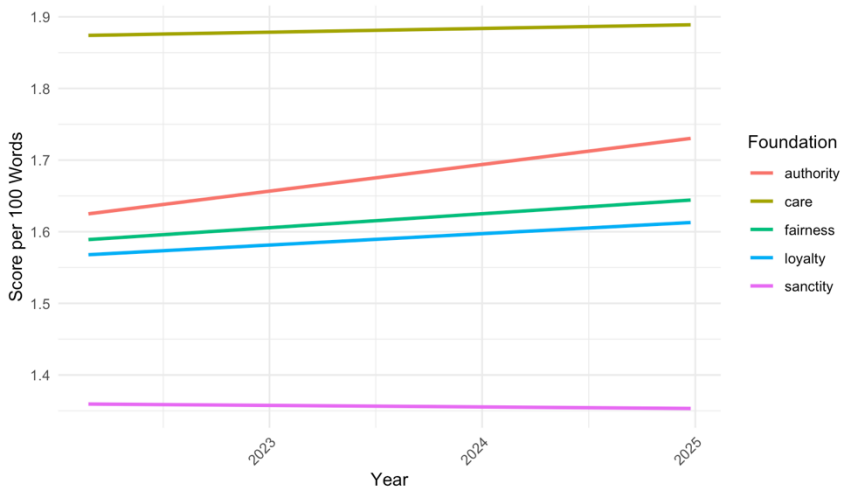
Appendix E. Residual Diagnostic Plots for The Times Model (Study 2)



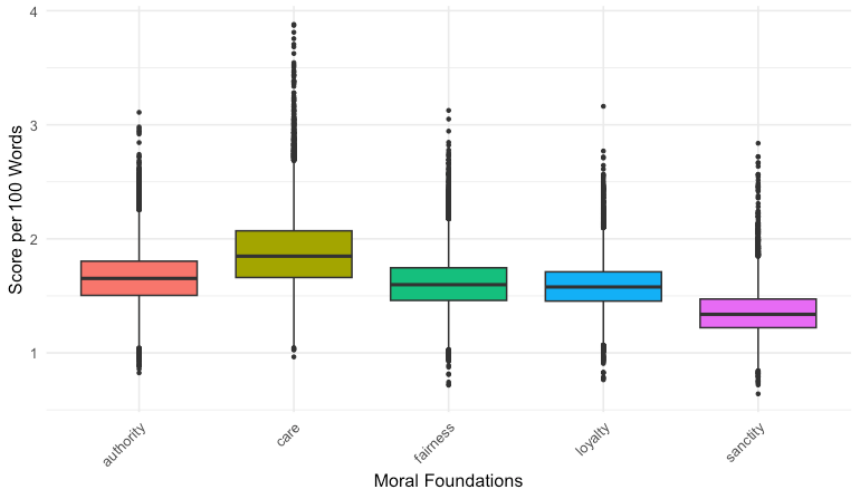
Appendix F. Care/Harm Score by Partisan Affiliation



Appendix G. Trends in Moral Foundation Language Over Time



Appendix H. Distribution of Moral Foundation Scores Across Articles



9 Abstract

When Violence No Longer Hurts: A Study of Public Desensitization Reflected in News Coverage of the Russia-Ukraine War

Abstract

This study employs a computational text analysis approach to investigate news coverage of the Russia-Ukraine war and examine desensitization, which refers to a decline in emotional responsiveness over time due to repeated exposure. Drawing on the bottom-up perspective of agenda-setting theory, this study posits that news media reflect public sentiment over time. The study asks: How does news coverage of the Russia-Ukraine war reflect public-level desensitization to violence over time? To address this, the study first analyzes the news sentiment using the Lexicoder Sentiment Dictionary (LSD). The results reveal that sentiment becomes less negative over time, suggesting evidence of desensitization to violence. The second part focuses on moral language, specifically the care/harm foundation from Moral Foundations Theory (MFT). Using the extended Moral Foundations Dictionary (eMFD), the study finds no significant correlation between time and the strength of care/harm language, thereby rejecting the second hypothesis that empathy-related care/harm language would decline over time.

Keywords

Agenda-setting, Desensitization, Extended Moral Foundations Dictionary (eMFD), Lexicoder Sentiment Dictionary (LSD), Moral Foundations Theory (MFT), News coverage, Russia-Ukraine war, Sentiment analysis

Wenn Gewalt nicht mehr wehtut: Eine Studie zur öffentlichen Desensibilisierung in der Nachrichtenberichterstattung über den Russland-Ukraine-Krieg

Abstract (German)

Diese Studie wendet einen computergestützten Textanalyseansatz an, um die Berichterstattung über den Russland-Ukraine-Krieg in *The Independent*, *The Times* und *The Daily Telegraph* zu untersuchen und Desensibilisierung zu analysieren – also einen Rückgang der emotionalen Reaktionsfähigkeit infolge wiederholter Konfrontation. Ausgehend von der Bottom-up-Perspektive der Agenda-Setting-Theorie geht die Studie davon aus, dass Nachrichtenmedien im Zeitverlauf die öffentliche Stimmung widerspiegeln. Die zentrale Forschungsfrage lautet: Wie spiegelt die Berichterstattung über den Russland-Ukraine-Krieg eine Desensibilisierung auf gesellschaftlicher Ebene gegenüber Gewalt im Zeitverlauf wider?

Zur Beantwortung dieser Frage analysiert die Studie zunächst das Nachrichtensentiment mithilfe des Lexicoder Sentiment Dictionary (LSD). Die Ergebnisse zeigen, dass das Sentiment im Zeitverlauf weniger negativ wird, was als Hinweis auf eine Desensibilisierung interpretiert werden kann. Im zweiten Teil richtet die Studie den Fokus auf moralische Sprache, insbesondere auf die moralische Dimension Fürsorge/Schaden („care/harm“) aus der Moral Foundations Theory (MFT). Mithilfe des erweiterten Moral Foundations Dictionary (eMFD) lässt sich jedoch keine signifikante Korrelation zwischen dem Zeitverlauf und der Ausprägung der Fürsorge/Schaden-Sprache feststellen. Damit wird die zweite Hypothese, der zufolge empathiebezogene Fürsorge/Schaden-Sprache im Zeitverlauf abnehmen würde, verworfen.