Moral-Emotional Language on Reddit: Replicating and Challenging Brady et al.(2017)

Term Paper

submitted by

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1 Motivation and Background

In the age of digital communication, language plays a central role in shaping public discourse and influencing opinion dynamics. Social media platforms have become key arenas for the spread of emotionally and morally charged content, with potential implications for political polarization, collective action and misinformation (Garrett, 2019). Viral content has been shown to shape major political outcomes, from the mobilization during the Arab Spring to voter persuasion and turnout in U.S. presidential elections. Understanding which forms of language "go viral" is a key concern across social science and political communication.

A prominent theoretical framework addressing this issue is Moral Contagion Theory, developed by Brady et al. (2017). Based on a large corpus of politically relevant Twitter messages, the authors argue that content combining moral and emotional language is particularly likely to be reshared. In their study, the presence of moral-emotional words significantly predicted higher retweet counts, even when controlling for alternative explanations such as message length or topic. The underlying mechanism is rooted in psychological theory: moral-emotional language is thought to activate both normative judgments and affective arousal (e.g. Horberg et al. (2011), Ellsworth and Scherer (2003)), which increases the likelihood that a message is noticed, remembered and shared. In that sense, moral-emotional expressions do not just inform readers but also motivate them to act.

Crucially, this effect was stronger than the effect of purely moral or emotional language, suggesting that the combination of both dimensions makes messages particularly impactful. Moral contagion theory thus provides an explanation for how small differences in wording can shape the way information spreads, particularly in the context of political polarization.

However, recent work has challenged the generalizability and robustness of the original findings. In particular, Burton et al. (2019) conducted a replication study using multiple Twitter datasets and found that moral contagion effects were often weak, inconsistent or entirely absent, suggesting that the phenomenon may be more context-dependent than originally assumed. Building on this, Burton et al. (2021) offered a broader critique of the analytical approach used by Brady et al. They warned against drawing strong conclusions from small effects in large observational datasets and stressed the need to clearly separate actual psychological effects from patterns that may emerge due to dataset structure or size.

While Brady et al. (2025) responded with a meta-analysis that reaffirmed the average effect of moral-emotional language, the overall debate highlights important concerns regarding measurement validity, domain specificity and the need to replicate findings across different platforms and discursive contexts. Taken together, these contributions

underscore the need to test the theory beyond Twitter, using alternative metrics and varying normative conditions.

This project addresses that gap by replicating the logic of Moral Contagion Theory using Reddit data instead of Twitter. Reddit differs substantially from Twitter in content structure, moderation and diffusion mechanisms (e.g., upvotes vs. retweets). Moreover, Reddit communities (subreddits) vary widely in their discourse norms, from highly polarized spaces to rule-bound forums. The platform has also demonstrated its unique capacity to drive large-scale collective behavior, most notably during the 2021 GameStop episode, where users coordinated market actions that defied traditional investor logic. This highlights Reddit's potential to amplify norm-driven and emotionally charged narratives, making it a relevant setting for studying the spread of moral-emotional language.

In line with previous findings and current debates, this study tests the following hypotheses:

> **Hypothesis 1:** *Posts using more moral-emotional language receive higher upvotes than those with less.*
>
> **Hypothesis 2:** *The effect of moral-emotional language is stronger than that of purely moral or emotional language alone.*
>
> **Hypothesis 3:** *The size and direction of this effect vary across subreddits, depending on their discourse norms and moderation rules.*

2 Data Retrieval

The data used in this study were retrieved from a publicly available Reddit archive distributed via Academic Torrents. The dataset covers all Reddit submissions from June 2005 through December 2024 and is organized in subreddit-specific .zst compressed files. However, the subreddits selected for this study became active only in later years, so the analyzed data does not extend back to the earliest period of the archive. The relevant files were downloaded using the open-source torrent client qBittorrent, decompressed locally and subsequently processed using Python version 3.13.0.

The analysis focuses on four subreddits that address morally and politically sensitive topics. Thematically, these subreddits align with issue areas analyzed in prior moral contagion studies. All selected communities explicitly claim to promote balanced and civil discourse, which was confirmed through manual inspection of moderation guidelines and post content. For instance, r/AbortionDebate and r/NeutralPolitics are structured around norms of respectful disagreement and multiperspective debate, while

r/CovidVaccinated and r/IsraelPalestine also emphasize neutrality, although with occasional deviations in tone and content. The activity levels of these subreddits vary over time: r/CovidVaccinated experienced peak engagement during the COVID-19 pandemic and has since declined, while r/IsraelPalestine saw a dramatic increase in activity following the outbreak of the Israel–Gaza conflict in October 2023. r/AbortionDebate and r/NeutralPolitics, in contrast, have shown more stable growth. However, since this study does not rely on time series or temporal comparisons, fluctuations in subreddit activity are not expected to influence the main results.

Topic	**Reddit Submission**
r/AbortionDebate	How does the Pro-Choice movement counter arguments that a human fetus is a person? For pro-lifers who argue that sex is purely to make babies, do you support the idea of female circumcision?
r/CovidVaccinated	So far I only have a sore arm, just like with getting any other vaccine. I'll update if anything new happens. I got the vaccine a couple days ago and since then I've been in such a horrible, depressed, irritable mood. Anyone else?
r/IsraelPalestine	The world condemns israel so much but it allways turn a blind eye to almost everything the palestinians do. i just dont get it As far as Jordan, why isn't there just one big Arab state? Why separate from Palestine?
r/NeutralPolitics	If tax cuts essentially put money in peoples' pockets, why wasn't there a multiplicative effect on the economy? I get the feeling that populist leaders often are derided or thought of poorly, even though they base of support comes from the population. Theoretically.

Table 1: Sample submissions from each subreddit

Only original Reddit submissions (i.e., top-level posts) were included in the analysis. User comments were excluded entirely. This decision was made for both conceptual and practical reasons. Submissions are the primary units of content generation and visibility on Reddit and carry the features most relevant for diffusion. In contrast, comments often respond to prior content rather than initiate new discussions and tend to be more controversial.

To ensure that each observation contained sufficient linguistic material for analysis, only submissions with non-empty *selftext* fields (i.e., the text of the submission itself, not the title) were retained. Posts that consisted solely of numeric content, hyperlinks or default system responses such as "[removed]", "[deleted]" or an empty string were filtered out. Additionally, pinned posts were removed, as these often reflect moderator announcements and are not comparable to regular user submissions in terms of visibility or structure. Finally, all submissions exceeding 10,000 characters in length were removed to ensure model convergence. Further details are provided in the methodology

section.

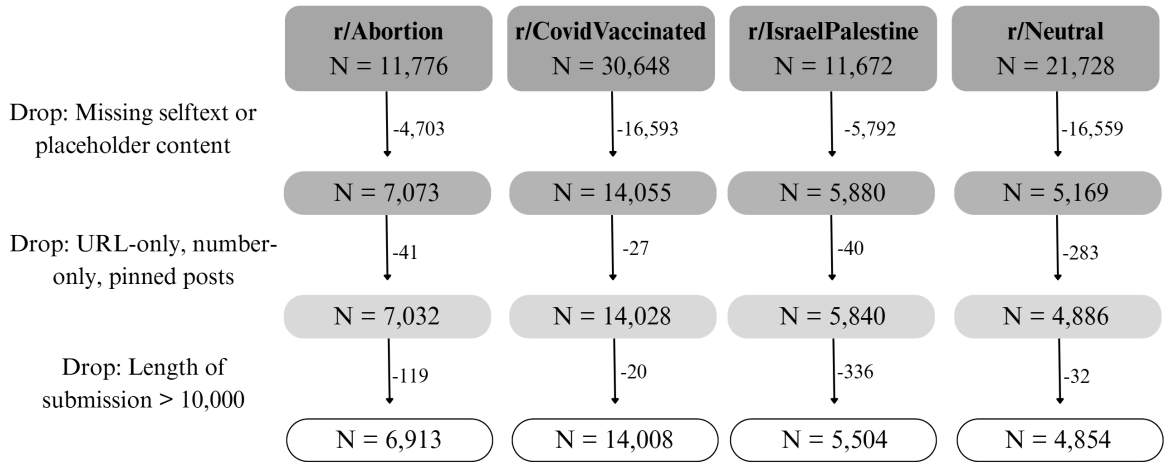

Figure 1: Stepwise filtering of Reddit submissions across domain-specific datasets. Counts reflect remaining observations after each exclusion criterion.

For each post, three mutually exclusive word count variables were computed using dictionary-based text analysis. These represent the number of (1) moral words that are not emotional (e.g. duty, $n = 316$), (2) emotional words that are not moral (e.g. fear, $n = 819$) and (3) words that appear in both dictionaries, classified as moral-emotional (e.g. hate, $n = 72$). This categorization ensures that each word is counted in only one category, allowing for a clear distinction between different types of morally and emotionally charged language. The moral lexicon was based on the Moral Foundations Dictionary, which is publicly available via the Open Science Framework (e.g.Chan et al. (2019)). The emotional lexicon was reconstructed using word lists from the replication materials of Burton et al. (2021), who themselves followed the original implementation of LIWC categories used in Brady et al. (2017). While the resulting category sizes differ slightly from those reported in the original study by Brady et al. (2017), the differences are minimal and unlikely to affect the overall interpretation of results. To extract these word frequencies, each submission was lowercased and tokenized, with punctuation removed. The resulting tokens were matched against the dictionary entries using a pattern-matching approach that allows for flexible word stems, ensuring consistency with prior work.

The resulting dataset thus includes a cleaned and preprocessed sample of Reddit posts from diverse yet consistently moderated subreddits, each annotated with key linguistic features needed for testing the theoretical claims of Moral Contagion Theory.

3 Methods

To assess the relationship between language use and post contagion on Reddit, the analysis employs a negative binomial regression model estimated via maximum like-

lihood. This choice is motivated by the distribution of the dependent variable, the Reddit score of a post (i.e., upvotes minus downvotes), which constitutes count data with substantial overdispersion (Hilbe, 2011). A likelihood ratio test comparing the negative binomial model to a Poisson model confirmed the presence of overdispersion, justifying the need for a dispersion parameter. The modeling strategy closely follows Brady et al. (2017), who also used negative binomial regression to model retweet counts on Twitter. Even though retweets and upvotes represent distinct mechanisms of diffusion, they both reflect the visibility of a post and pose similar modeling challenges due to their skewed count distributions.

The primary predictors include standardized counts of moral, emotional and moral-emotional words per submission, as defined in Section 2. These categories are mutually exclusive and based on the dictionary structure used in prior replications (e.g. Burton et al. (2021)). Submission length was included as a control variable to adjust for differences in the amount of written content. Unlike Brady et al. (2017), who grand-mean centered their predictors, all continuous variables in this study were z-standardized (mean = 0, standard deviation = 1). This decision was taken due to convergence issues encountered during estimation, particularly related to extremely long submissions. Posts with over 10,000 words were removed prior to modeling ($< 1,6\%$ of the data), which, together with z-standardization ensured stable convergence in the final model.

The model was estimated using Python's *statsmodels* package. All coefficients are reported as Incidence Rate Ratios (IRRs), following the convention used in the original study. IRRs indicate the expected multiplicative change in the Reddit score for a one-unit increase in the respective predictor, holding all other variables constant (Martuzzi and Elliott, 1998). Since all predictors in this study were z-standardized, a "one-unit" increase corresponds to a shift of one standard deviation from the variable's mean. As a result, the IRRs in this analysis do not reflect the effect of a single additional word, but rather the effect of an increase from an average to an above-average level of language use. The base model used to test H1 and H2 is specified as:

$$\log(\mu_i) = \beta_0 + \beta_1 \cdot \text{Moral}_i + \beta_2 \cdot \text{Emotional}_i + \beta_3 \cdot \text{MoralEmo}_i + \beta_4 \cdot \text{Length}_i,$$

$$\text{where } \mu_i \text{ denotes the expected Reddit score of submission } i$$

Although the dependent variable itself is not log-transformed, the negative binomial model uses a logarithmic link function to relate the linear combination of predictors to the expected Reddit score. This means the model estimates the logarithm of the expected count, ensuring that predicted values remain strictly positive and allowing multiplicative effects to be interpreted through IRRs.

To investigate whether the effect of moral-emotional language varies across communities (H3), a second model includes interaction terms between moral-emotional word use and subreddit dummy variables. While the previous models were estimated separately for each subreddit, allowing for qualitative comparisons between effect sizes, they did not permit formal statistical testing of whether these differences are significant across communities. The interaction model addresses this limitation by combining all subreddits into a single estimation and explicitly modeling the conditional effect of moral-emotional language for each community. This approach not only allows for direct comparison of effect magnitudes across domains but also enables formal inference about whether observed differences are statistically significant. Hence, the model used to test H3 is as follows:

$$\begin{aligned}\log(\mu_i) = \beta_0 &+ \beta_1 \cdot \text{Moral}_i + \beta_2 \cdot \text{Emotional}_i + \beta_3 \cdot \text{MoralEmo}_i + \beta_4 \cdot \text{Length}_i \\ &+ \gamma_1 \cdot \text{Abortion}_i + \gamma_2 \cdot \text{Vaccines}_i + \gamma_3 \cdot \text{Israel}_i \\ &+ \delta_1 \cdot (\text{MoralEmo}_i \times \text{Abortion}_i) + \delta_2 \cdot (\text{MoralEmo}_i \times \text{Vaccines}_i) \\ &+ \delta_3 \cdot (\text{MoralEmo}_i \times \text{Israel}_i)\end{aligned}$$

where μ_i is the expected Reddit score of post i,

β_1 to β_4 represent the main effects in r/NeutralPolitics,

γ_1 to γ_3 adjust for subreddit-specific intercepts,

δ_1 to δ_3 capture differences in the effect of moral-emotional language.

4 Results

To examine how language affects post visibility on Reddit, negative binomial models were estimated separately for each subreddit. Table 2 reports IRRs for each predictor, holding all other variables constant. The dependent variable is the Reddit score of a submission, capturing user engagement through upvotes and downvotes.

Across domains, results provide mixed support for H1, which hypothesized that moral-emotional language increases post visibility. In the r/IsraelPalestine subreddit, moral-emotional language is significantly associated with higher scores ($IRR = 1.20, p < .05$), suggesting increased diffusion. In r/NeutralPolitics, the effect is also significant but negative ($IRR = 0.86, p < .05$), indicating a potential backlash or norm violation penalty. For r/CovidVaccinated, the effects are small, while those for r/AbortionDebate fail to reach statistical significance.

Turning to H2, the models reveal that moral-emotional language does not consistently outperform purely moral or emotional language. In r/CovidVaccinated, distinctly emo-

	Submission Score			
	Abortion	Vaccines	Israel/Palestine	Neutral
Distinctly emotional language	0.99	1.07*	0.98	0.71*
	(0.03)	(0.02)	(0.04)	(0.03)
Distinctly moral language	0.91*	1.07*	1.00	0.93*
	(0.02)	(0.01)	(0.03)	(0.03)
Moral-emotional language	1.02	0.96*	1.20*	0.86*
	(0.02)	(0.01)	(0.03)	(0.02)
Submission Length	1.20*	1.20*	0.95	1.81*
	(0.03)	(0.02)	(0.05)	(0.04)
Constant	16.72*	15.62*	21.62*	180.24*
	(0.01)	(0.01)	(0.02)	(0.02)
Observations	6,913	14,008	5,504	4,854

Note:*p<0.05

Table 2: Negative Binomial Models Predicting Submission Score by Domain. Coefficients refer to incident rate ratios, parenthesis refer to standard errors.

tional ($IRR = 1.07, p < .05$) and distinctly moral language ($IRR = 1.07, p < .05$) both show significant positive effects, while moral-emotional language has a slightly negative effect ($IRR = 0.96, p < .05$). This pattern is reversed in r/IsraelPalestine, where moral-emotional language yields the strongest positive effect. Notably, in r/NeutralPolitics, all three forms of moral or emotional language are significantly associated with lower post scores, with the strongest negative effect observed for distinctly emotional language ($IRR = 0.71, p < .05$).

Longer submissions are consistently associated with higher scores, indicating that message length contributes to visibility. An exception to this pattern is observed in r/IsraelPalestine, where the association between submission length and score is weaker and not statistically significant. Controlling for length helps isolate the specific contribution of moral and emotional language.

Figure 2 visualizes the predicted Reddit score as a function of word use across all three language categories: distinctly moral, distinctly emotional, and moral-emotional. This plot extends the original visualization from Brady et al. (2017) by incorporating the full set of predictors used in the replication model. The figure illustrates that moral-emotional language increases visibility in certain subreddits (e.g., r/IsraelPalestine), but reduces it in others (e.g., r/NeutralPolitics), consistent with Table 2.

The original replication plots focusing only on moral and moral-emotional language (as shown in Brady et al. (2017)) are included in the Appendix (Figure 3).

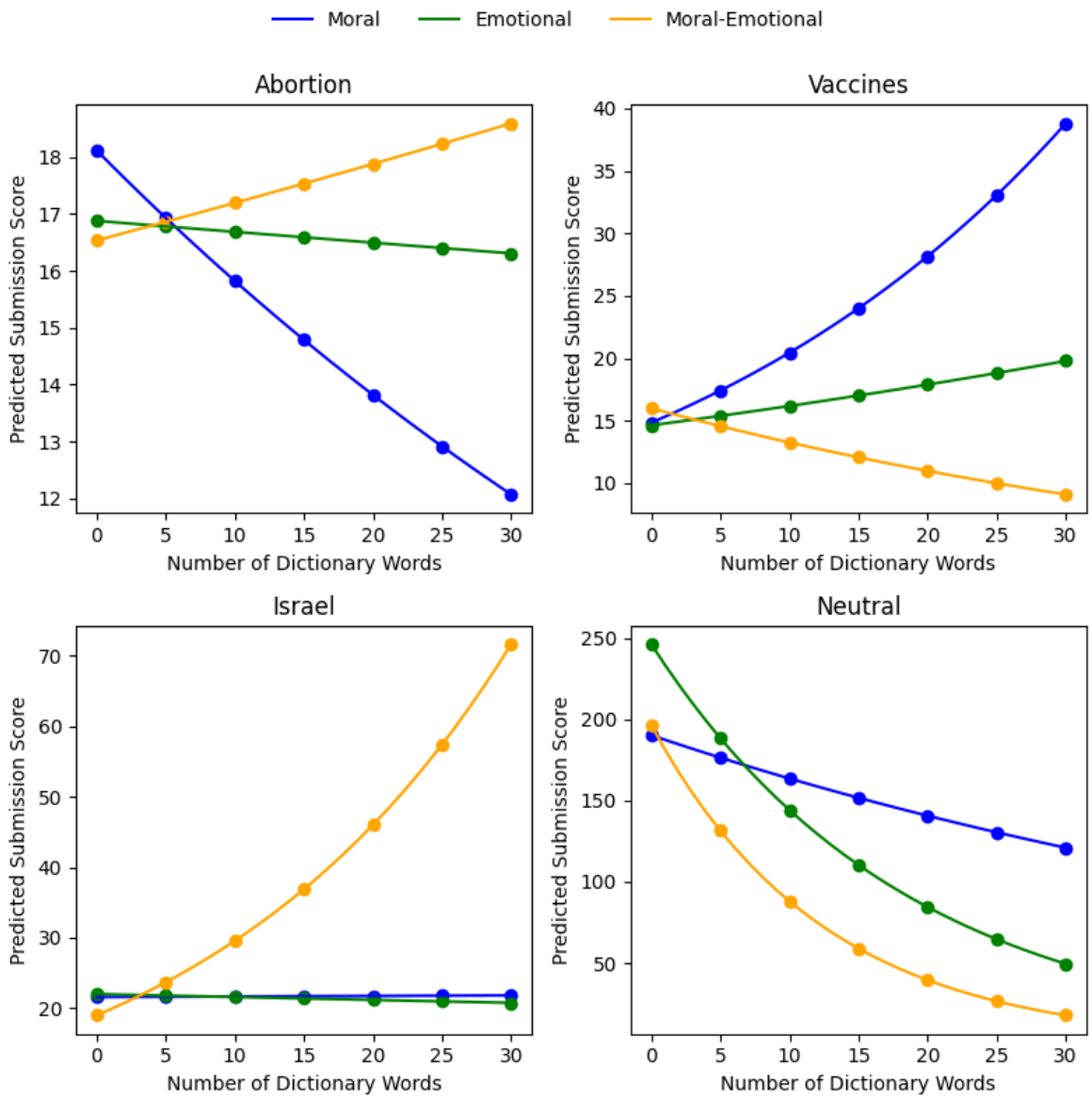

Figure 2: The graph depicts the score of a submission, at the mean level of continuous covariates, predicted for a given score as a function of moral, emotional and moral-emotional language present in the post.

Overall, the findings offer partial support for H1 and H2 and suggest that Twitter-based contagion effects do not replicate universally on Reddit. Instead, the relationship appears to depend on the discursive norms and topical sensitivities of each subreddit.

To formally test whether the effect of moral-emotional language varies across subreddits, interaction terms between the moral-emotional word count and subreddit dummies were included in a unified model (see Table 3, full model in Appendix (Table 4)). The results confirm the impression from the separate models: moral-emotional language significantly increases post scores in all three communities relative to r/NeutralPolitics, with the strongest effect observed in r/CovidVaccinated ($IRR = 1.40$). This pattern aligns with the critique by Burton et al. (2021), who argued that moral contagion

effects are often context-specific and less robust than initially assumed.

	Incidence Rate Ratios (IRRs) relative to r/NeutralPolitics		
	r/AbortionDebate	r/CovidVaccinated	r/IsraelPalestine
Moral-emotional count x subreddits	1.246	1.404	1.265

Table 3: Incidence Rate Ratios for moral-emotional language by subreddit, compared to r/NeutralPolitics

To assess the robustness of the main findings, several additional model specifications and sampling approaches were tested. First, negative binomial models were re-estimated using only the moral-emotional count variable without any control variables (Table 5), as well as using all three dictionary categories without additional covariates (Table 6). While the overall direction of effects remains largely consistent, some differences emerge. For example, the positive effect of moral-emotional language in r/CovidVaccinated becomes non-significant when controls are omitted, and the effect of distinctly moral language in r/NeutralPolitics becomes positive. These deviations appear inconsistent in direction and likely reflect model sensitivity rather than substantive shifts in the estimated effects.

Second, following Brady et al. (2017), a bootstrap-based within-cluster resampling procedure was implemented to address potential non-independence in the data. Since individual users often contributed multiple submissions, the bootstrap draws one post per author in each resample iteration and estimates the resulting effect size distributions. As shown in Figure 4 in the Appendix, the bootstrapped confidence intervals most of the times closely match the original estimates, supporting the overall stability of the effects.

Together, these robustness checks suggest that the results are not driven by model specification, overfitting or sampling bias. Full model outputs are reported in the Appendix.

5 Critique and Reflection

Despite applying a research design closely aligned with that of Brady et al. (2017), the findings reveal that the relationship between moral emotional language and political engagement on Reddit is more conditional and shaped by context than the original theory suggests. H1, which predicted that moral-emotional language enhances post contagion, found only partial support. The effect was positive and statistically significant in r/IsraelPalestine, but negative in r/NeutralPolitics and r/CovidVaccinated and null or weak in r/AbortionDebate. H2, which suggested that moral-emotional language is more impactful than purely moral or emotional language, was not consistently supported either. In some communities, distinctly moral or emotional language produced stronger associations with post scores than the combined category. Finally, H3, which proposed variation across subreddits, received clear support: interaction models revealed that the effect of moral-emotional language differs significantly across domains with different normative expectations and moderation policies.

Together, these results suggest that the diffusion of moral-emotional content is highly context-sensitive. Contrary to the more generalizable claims in Brady et al. (2017), the Reddit-based analysis points to a platform environment in which moral contagion is not a universal mechanism but one that interacts with the user expectations and topical sensitivities of specific communities.

One likely reason for this difference is platform architecture. Twitter emphasizes speed, virality and public exposure, with a flat network structure and an algorithmic boost for high-engagement content (Vosoughi et al., 2018). Reddit, in contrast, is community-based, heavily moderated and organized around interest-specific subforums (Chandrasekharan et al., 2017). The visibility of a post is determined less by passive sharing and more by active engagement within a rule-bound space. As a result, the same language that might be rewarded on Twitter can be penalized on Reddit, especially in norm-oriented subreddits like r/NeutralPolitics. Another important difference lies in content length. During the period covered by many earlier Twitter studies, tweets were restricted to just 140 characters, which limited users to highly condensed expressions of emotion or moral judgment. Reddit submissions, by contrast, allow for much longer and more elaborated forms of argumentation, often extending to hundreds or even thousands of words. Even though this study controls for submission length, Reddit still allows for a very different style of expression and argumentation than Twitter.

These findings are more in line with the critical perspective offered by Burton et al. (2021), who emphasized the context-dependency of moral contagion effects. This view is already anticipated in earlier work by Burton et al. (2019), which questioned the robustness of the original Twitter-based findings and warned against overinterpreting

weak or unstable associations as universal psychological mechanisms.

From a methodological standpoint, the study demonstrates both the value and the limits of dictionary-based approaches to language measurement. While dictionaries like those used here are replicable and interpretable, they may not capture the nuanced features of moral language in different contexts. For example, sarcasm, irony or community-specific language norms may alter how words are perceived and responded to. Recent methodological advances, such as the use of large language models (LLM's) in the meta-analysis by Brady et al. (2025), highlight alternative approaches that can potentially overcome some of these limitations. LLMs allow for more flexible and context-sensitive classifications of moral-emotional content, which may improve measurement validity across heterogeneous datasets.

Taken together, this study highlights the importance of contextualizing psychological theories of online behavior within light of the platform where communication takes place. While the concept of moral contagion proposed by Brady et al. (2017) still offers useful insights, its effects vary depending on the context and do not unfold in the same way across platforms. Rather than assuming the same effects everywhere, future research should explore how platform features and community dynamics shape the way language works. Taking context seriously will be essential for building more realistic and nuanced theories of how language spreads online.

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Appendix

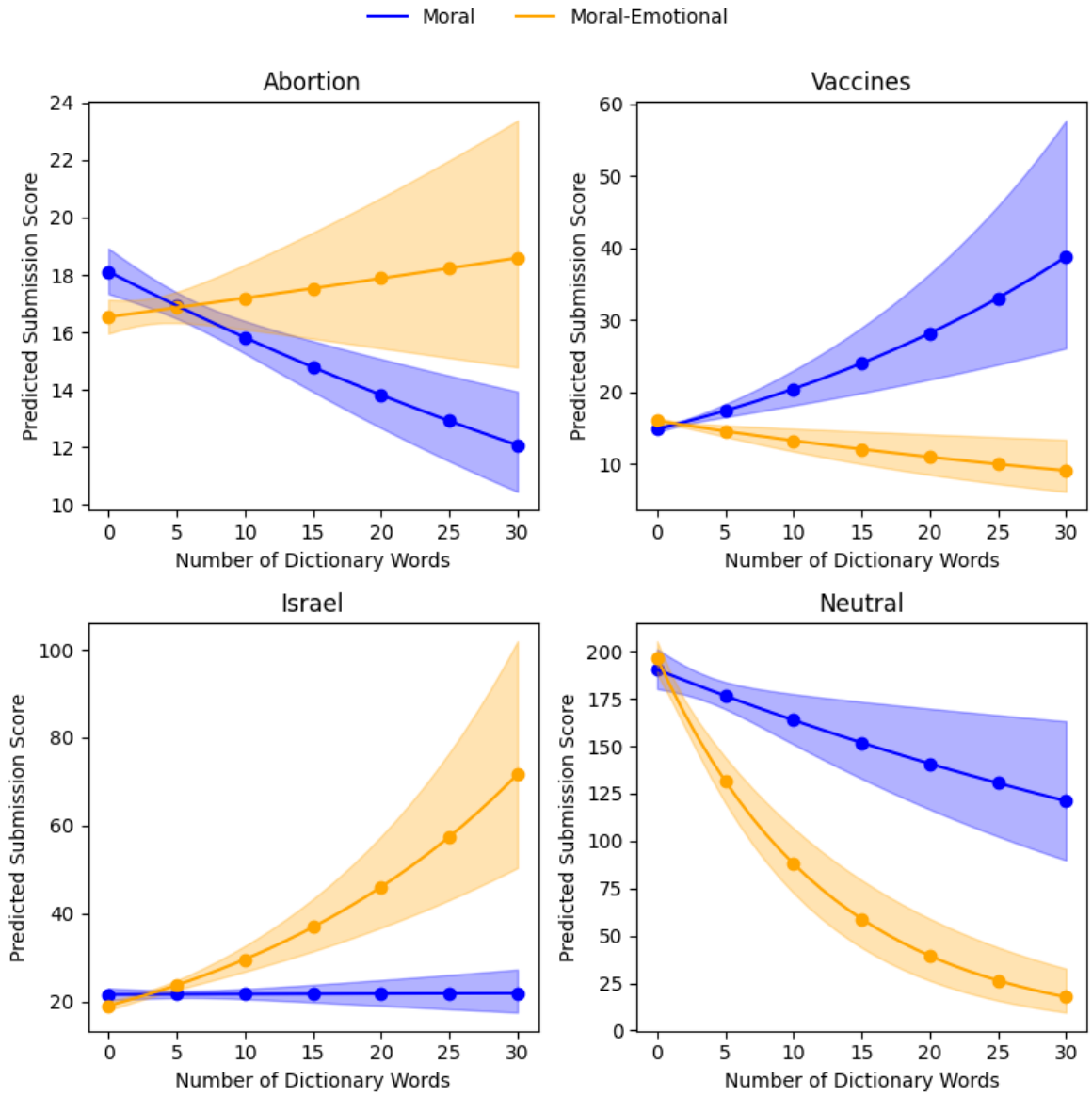

Figure 3: The graph depicts the score of a submission, at the mean level of continuous covariates, predicted for a given score as a function of moral and moral-emotional language present in the post. Bands reflect 95% CIs.

Variable	**IRR (SE)**	**z**	**95% CI**
Constant	171.16* (0.02)	255.79	[164.55, 178.04]
Emotional language	1.00 (0.01)	-0.32	[0.97, 1.02]
Moral language	0.94* (0.01)	-5.07	[0.92, 0.96]
Moral-emotional language	0.79* (0.03)	-8.12	[0.74, 0.83]
Submission length	1.25* (0.02)	12.50	[1.20, 1.29]
AbortionDebate (dummy)	0.10* (0.03)	-91.92	[0.09, 0.10]
CovidVaccinated (dummy)	0.10* (0.02)	-96.33	[0.09, 0.10]
IsraelPalestine (dummy)	0.12* (0.03)	-79.50	[0.12, 0.13]
MoralEmo × AbortionDebate	1.25* (0.03)	7.04	[1.17, 1.32]
MoralEmo × CovidVaccinated	1.40* (0.03)	9.84	[1.31, 1.50]
MoralEmo × IsraelPalestine	1.26* (0.03)	7.38	[1.19, 1.35]
Alpha (dispersion)	4.62* (0.01)	132.13	[4.51, 4.72]

Note: *p<0.05

Table 4: Negative Binomial Regression predicting Submission Score (full model with interactions)

	Submission Score			
	Abortion	Vaccines	Israel/Palestine	Neutral
Moral-emotional language	1.09* (0.01)	1.15* (0.01)	1.15* (0.02)	0.93* (0.02)
Constant	16.81* (0.01)	16.04* (0.01)	21.64* (0.02)	189.51* (0.02)
Observations	6,913	14,008	5,504	4,854

*Note:*p<0.05

Table 5: Submission Score as a function of moral-emotional language only. Coefficients refer to incident rate ratios; parenthesis refer to standard errors.

	Submission Score			
	Abortion	Vaccines	Israel/Palestine	Neutral
Distinctly emotional language	1.10*	1.21*	0.96	0.96
	(0.02)	(0.02)	(0.03)	(0.02)
Distinctly moral language	0.97	1.11*	0.99	1.15*
	(0.02)	(0.01)	(0.03)	(0.02)
Moral-emotional language	1.04*	0.99	1.19*	0.90*
	(0.02)	(0.01)	(0.03)	(0.02)
Constant	16.77*	15.67*	21.63*	188.18*
	(0.01)	(0.01)	(0.02)	(0.02)
Observations	6,913	14,008	5,504	4,854

Note:*p<0.05

Table 6: Submission Score as a function of words counts only (no controls). Coefficients refer to incident rate ratios; parenthesis refer to standard errors.

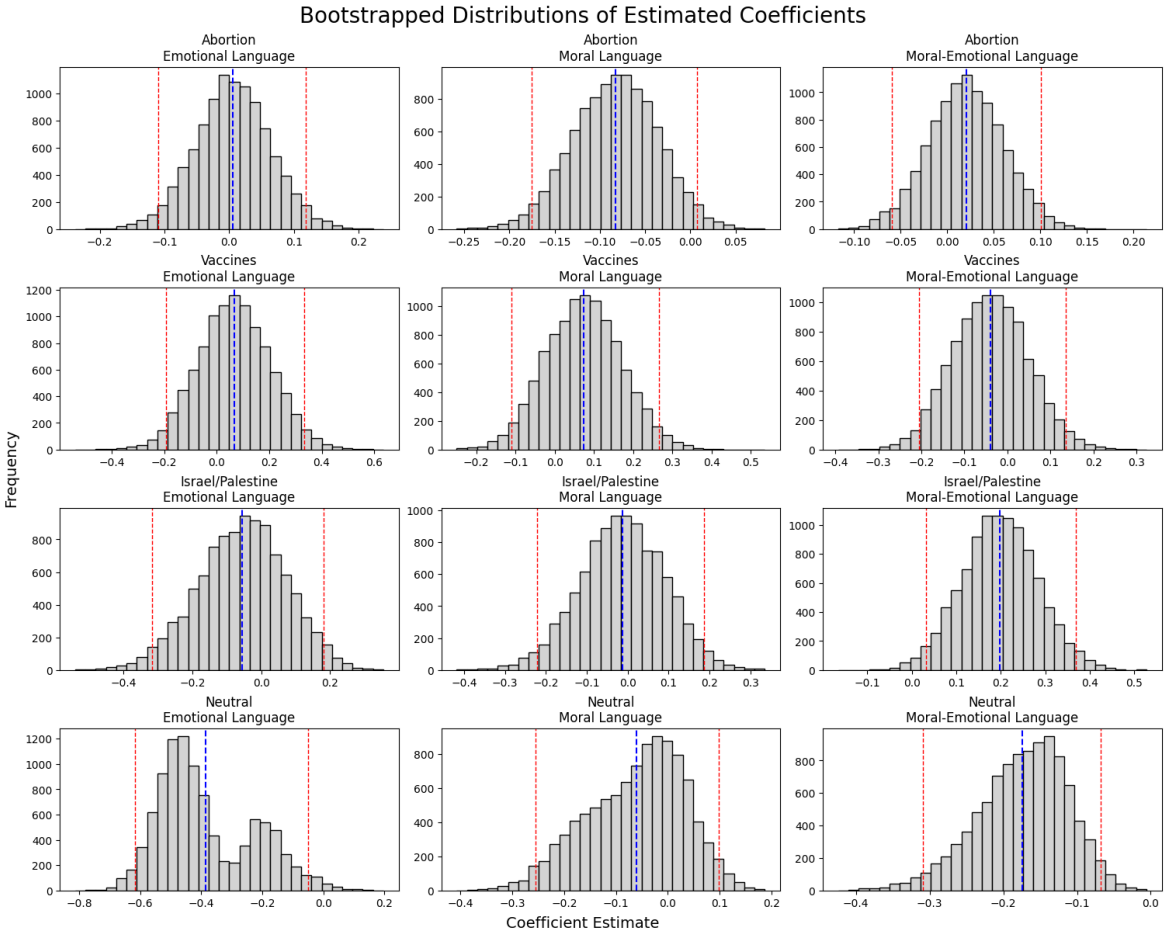

Figure 4: Results of repeated random sampling with bootstrapping. One submission was randomly selected from each user with multiple posts to form a data set. This processes was repeated 10,000 times to form a distribution of effect sizes for each variable and each data set. The mean coefficients are represented by the blue dotted line. 95% Cis are represented by the red dotted line.