

Appendix A: Engagement Level Operationalization

Engagement level was operationalized as the ratio of total comments to total views for each video (Comments/Views), providing a normalized measure of audience participatory behavior that accounts for variation in channel size and video reach. The following thresholds were applied:

Table A1. Engagement Level Classification Thresholds

Engagement Level	Comments/Views Ratio	Interpretation
Low	< 0.001	Minimal audience interaction relative to viewership
Medium	0.001 – 0.005	Moderate participatory engagement typical of standard political content
High	> 0.005	Elevated discussion activity suggesting high audience investment

Appendix B: Comment Polarization Coding Criteria and Examples

Comment polarization was assessed using a four-level ordinal scale adapted from prior research on online incivility (Coe et al., 2014; K uchler et al., 2023). For each video, two trained coders independently evaluated a systematic random sample of 50 comments, assessing three dimensions: (a) emotional tone, (b) language intensity, and (c) cross-partisan engagement.

Table B1. Comment Polarization Coding Criteria

Level	Definition	Operational Indicators
None	Absolutely rational discussion	Comments focus on policy substance or factual content; disagreements expressed through evidence and reasoning; absence of ad hominem attacks; no derogatory labels for political figures or opposing partisans
Mild	Some partisan tendencies but mostly rational discussion	Majority of comments engage substantively with content; occasional partisan expressions without overt hostility; criticism directed primarily at policies rather than persons; limited use of emotionally charged language
Moderate	Some space for rational discussion exists	Mixed presence of substantive and hostile comments; visible partisan mockery and personal attacks on political figures; competing viewpoints present but often dismissed rather than engaged; moderate use of derogatory terms and in-group/out-group language
High	Unequivocal expression of political tendencies	Pervasive partisan hostility dominating the comment section; frequent personal attacks and dehumanizing language toward opposing partisans; minimal substantive engagement with content; extensive use of extremist labels (e.g., "fascist," "traitor," "vermin"); strong in-group solidarity expressions combined with out-group derogation

Table B2. Representative Comment Examples by Polarization Level

Level	Representative Comment (paraphrased for brevity)
None	<i>"The real answer is that we have WAY too many people in prison and how can we call ourselves free when we imprison more people than China or India. We have 25% of all the imprisoned people in the world and are only 5% of the world population. It is horrific." "I'm a strong supporter of Harris. However, it is not accurate when she says that the U.S. has 'always' supported other countries' sovereignty. A short list from memory: Philippines, Mexico, Chile, Vietnam. So let's not be disillusioned but keep one truth in front of us: Neoliberalism is bad but fascism is awful."</i>
Mild	<i>"I agree with Kamala on most issues but I just wish you guys would stop with this 2025 stuff. I think it's a turn off because nobody ever said they agree with it or support it." "Credit to Republicans who are brave enough to speak up about Trump and support Harris. We have to stay vigilant!"</i>
Moderate	<i>"She's so phony on so many levels... no matter what color you are, you should be able to see and hear it... Plus, what has she done for anyone? Besides freeing criminals, that is..." "Trump fatigue is fatal. We are so burned out, embarrassed and worried. To other countries we are soooo trying to stop him and I feel like I should apologize for his hate."</i>
High	<i>"JD Vance... He lies even more than Trump! It's incredible... he is pure vermin... unmitigated, unadulterated disingenuous pabulum." "The only people who don't want Trump as President are the lawless, lying, America hating commies who don't care about their own." "Vote Blue and save the world from another Hitler or even someone much worse. Trump is a clear and present threat to the world. Trump is 100% pure evil. Trump is a sick, delusional monster."</i>

Note. Examples are paraphrased composites drawn from the corpus to protect commenter anonymity. Original comments were assessed holistically across all three dimensions before assignment.

Appendix C: Inter-Coder Reliability by Variable

This appendix reports variable-level inter-coder reliability for the framing analysis. Two trained coders independently coded all 373 videos following a calibration phase of 30 trial-coded videos resolved through consensus discussion.

Table C1. Cohen’s Kappa and Percent Agreement by Coding Variable (N = 373)

Variable	Percent Agreement	Cohen’s Kappa (κ)
Polarization Category	1.000	1.000
Engagement Level	1.000	1.000
Partisan Mockery	0.997	0.992
Personal Image	0.995	0.992
Thumbnail Type	0.995	0.990
Stance Expression Method	0.989	0.983
Political Symbols	0.989	0.981
Main Issue	0.987	0.975
Content Serialization	0.992	0.974
Political Stance	0.981	0.973
Political Keywords	0.981	0.970
Issue Frame Type	0.976	0.964
Comment Polarization	0.976	0.959
Target Orientation	0.971	0.956
Emotional Intensity	0.973	0.956
Opinion Distribution	0.973	0.955
Dominant Emotion	0.963	0.952
Average	0.984	0.975

Note. All variables exceeded the recommended threshold of $\kappa \geq 0.80$ for content analysis. Average Kappa = 0.975 (range: 0.952–1.000).

Appendix D: Detailed Coding Category Descriptions

This appendix provides detailed operational definitions for each coding category used in the framing analysis (see Table 1 in the main text).

Table D1. Framing Analysis: Detailed Coding Category Descriptions

Category	Subcategory	Operational Definition
Video Duration	Short (<5 min)	Typically brief commentary, reaction clips, or news summaries.
	Medium (5–14 min)	Standard-length political commentary with moderate depth of analysis.
	Long (15–44 min)	Extended discussions, interviews, or in-depth policy analysis.
	Extra-long (≥45 min)	Long-form livestreams, panel discussions, or comprehensive coverage.
Thumbnail Type	Political figure close-up	Prominent display of a political figure (candidate, party leader) as the primary visual element.
	Text + figure combination	Political figure combined with overlaid text (headlines, quotes, or commentary).
	Non-political figure close-up	The influencer or other non-political figure as the primary visual element.
	Others	Abstract graphics, stock images, or other non-person visual elements.
Title Strategy	Neutral description	Factual, informational titles without emotional framing.
	Emotional inducement	Titles designed to provoke an emotional response (outrage, fear, excitement).
	Click-bait	Sensationalized, exaggerated, or curiosity-driven titles.
	Question-oriented	Titles framed as questions to encourage viewer engagement.
Issue Frame Type	Crisis frame	Presenting issues as urgent threats or serious problems
	Opportunity frame	Presenting issues as positive developments or favorable opportunities
	Moral frame	Presenting issues from ethical and value-based right/wrong perspectives
	Explanatory frame	Presenting issues as facts and providing explanations
	Economic frame	Presenting issues from cost-benefit and economic impact perspectives
Stance Expression Method	Direct expression	Clear expression of support or opposition to specific political positions
	Implicit suggestion	Expressing support or opposition through hints and indirect language
	Satirical criticism	Using emotional, descriptive language for opposition
	Education & explanation	Mainly providing education to audiences and explaining policies
Main Issues	Economy	Fiscal policy, taxation, employment, trade and other economic topics
	Campaign events	Discussion of campaign events themselves and their figures
	Culture	Values, religion, tradition and other cultural issues
	Foreign affairs	International relations, military, globalization and other foreign policies
	Institutional	Government structure, electoral systems, judiciary and other systemic issues
Dominant Emotion	Anger	Inspiring dissatisfaction and indignation toward current situation or opponents
	Fear & worry	Emphasizing threats and dangers, promoting defensive actions
	Hope & pride	Conveying optimistic prospects, inspiring positive expectations, strengthening

		group identity
	Humor & mockery	Expressing viewpoints through entertaining discourse and satirical expressions
	Rationality	Logic and fact-based, with relatively mild emotional coloring
Emotional Intensity	Low intensity	Very little expression of creator emotions
	Medium intensity	Some emotional expression present
	High intensity	Almost saturated with emotional expression
Target Orientation	Group identity	Strengthening "us vs them" group boundaries
	Call to action	Prompting audiences to take specific political actions
	Opinion persuasion	Outputting viewpoints and providing evidence
	Emotional catharsis	Providing emotional release channels for audiences
Comment Polarization	None	Rational, policy-focused discussion without partisan markers.
	Mild	Some partisan stance expression; substantive cross-ideological engagement maintained.
	Moderate	Prevalent partisan language with limited cross-partisan dialogue.
	High	Pervasive partisan hostility, personal attacks, or categorical dismissal of opposing views.
Opinion Distribution	One-sided	Vast majority of comments support video viewpoint
	Supportive	Supporters are majority but with few opposing voices
	Divided	Supporting and opposing viewpoints are evenly matched
	Opposed	Opposition majority, fewer supporters

Note. Additional coding categories (Political Keywords, Political Stance, Partisan Mockery, Stance Expression Method, Main Issues, Political Symbols, Personal Image, Target Orientation, Content Serialization, Engagement Level, Opinion Distribution) are reported in Table 1 of the main text with self-explanatory subcategory labels. Full codebook available from the authors upon request.

Appendix E: Cross-Tabulation of Video Frames and LDA Topic Distribution

This appendix presents the cross-tabulation results linking manually coded video-level framing variables with LDA topic distributions in associated comment sections. Topic labels: T1 = Trump Truth Controversy; T2 = Election Mobilization & Outcomes; T3 = Religious Moral Conflicts; T4 = Economic Security & Extremism Accusations; T5 = Racial Identity Politics; T6 = Media Narratives & Personal Attacks; T7 = Education & Generational Divides; T8 = Controversial Policies & Conspiracy Theories.

Note on inclusion criteria. To ensure stable video-level LDA topic proportion estimates, the cross-tabulations below include only videos with at least 100 preprocessed comments ($n = 342$ of 373). Videos below this threshold—primarily extra-long livestream recordings and late-campaign content with limited comment accumulation—were excluded because their small comment pools yield unreliable topic distributions (cf. Maier et al., 2021). The excluded videos (3 Democratic, 28 Republican) collectively account for less than 0.84% of the total comment corpus. The Economic frame (Democratic: $n = 1$, Republican: $n = 0$) and the "None" polarization level (Democratic: $n = 0$, Republican: $n = 3$) are omitted from Tables E1 and E3, respectively, due to insufficient cell sizes.

Table E1. LDA Topic Distribution (%) by Video Frame Type and Party

Category	N	T1	T2	T3	T4	T5	T6	T7	T8
Democratic									
Crisis frame	50	26.36	21.36	4.19	10.32	7.80	20.68	7.26	2.03
Opportunity frame	75	27.96	25.61	2.85	8.96	6.22	20.17	6.39	1.84
Explanatory frame	9	27.51	22.89	7.59	9.25	9.85	14.52	6.70	1.69
Moral frame	54	24.49	17.02	4.04	11.49	8.00	23.73	8.48	2.74
Republican									
Crisis frame	15	23.31	17.51	6.45	12.42	10.19	20.83	7.36	1.93
Opportunity frame	92	23.34	18.51	5.90	9.86	12.29	21.49	6.16	2.45
Explanatory frame	29	23.65	16.69	4.16	11.98	11.88	17.38	11.51	2.75
Moral frame	17	17.39	13.41	8.65	11.02	10.81	23.83	12.18	2.71

Note. Values represent the mean proportion (%) of each LDA topic in comments associated with videos of the given frame type. Bolded values highlight the highest Topic 6 proportions: moral frames show elevated personal attacks across both parties (Dem: 23.73%, Rep: 23.83%).

Table E2. LDA Topic Distribution (%) by Dominant Emotion and Party

Category	N	T1	T2	T3	T4	T5	T6	T7	T8
Democratic									
Hope & pride	34	26.82	29.18	2.70	9.80	4.89	18.40	6.23	1.97
Humor & mockery	55	25.18	15.55	4.40	8.85	8.26	26.44	8.98	2.35
Fear & worry	37	24.22	24.14	3.86	11.16	8.13	19.09	6.98	2.42
Anger	30	28.02	17.20	3.75	11.47	8.68	21.96	6.60	2.31
Rationality	33	29.15	26.17	3.73	10.52	6.04	16.70	6.20	1.50
Republican									
Hope & pride	37	23.10	23.20	7.55	9.92	10.98	17.40	5.70	2.16
Humor & mockery	54	23.90	16.94	3.72	9.89	13.55	22.19	6.91	2.89
Fear & worry	10	23.88	16.75	7.63	13.17	8.71	18.79	8.37	2.70
Anger	20	17.37	12.79	8.06	12.50	11.35	24.75	10.50	2.69
Rationality	32	23.33	15.04	5.93	10.78	11.26	21.06	10.62	1.98

Note. Humor-dominant videos show the highest Topic 6 (personal attacks) proportions across both parties (Dem: 26.44%, Rep: 22.19%), confirming the link between satirical content and personalized political discourse.

Table E3. LDA Topic Distribution (%) by Comment Polarization Level and Party

Category	N	T1	T2	T3	T4	T5	T6	T7	T8
Democratic									
Mild polarization	16	29.47	19.84	2.25	11.94	11.92	14.22	7.94	2.42
Moderate polarization	78	26.27	23.23	3.79	11.24	6.86	19.64	6.83	2.14
High polarization	95	26.06	20.96	4.00	9.01	6.90	23.54	7.44	2.10
Republican									
Mild polarization	18	20.59	18.47	8.69	14.03	9.60	17.27	8.32	3.04
Moderate polarization	52	24.44	17.45	6.47	10.33	12.89	16.51	8.92	2.99
High polarization	82	22.11	17.26	4.96	10.07	11.72	24.57	7.29	2.02

Note. Topic 6 (Media Narratives and Personal Attacks) proportions increase with polarization level for both parties: Democratic (Mild: 14.22% → High: 23.54%) and Republican (Mild: 17.27% → High: 24.57%), indicating a systematic association between comment polarization and personalized attack discourse.

Table E4. LDA Topic Distribution (%) by Engagement Level and Party

Category	N	T1	T2	T3	T4	T5	T6	T7	T8
Democratic									
Low engagement	18	24.69	21.54	4.13	8.70	8.75	22.03	7.74	2.40
Medium engagement	70	26.89	22.78	3.65	10.18	7.01	20.54	6.77	2.18
High engagement	101	26.42	21.17	3.78	10.44	7.26	21.40	7.46	2.07
Republican									
Low engagement	13	23.89	14.36	11.92	10.30	9.91	19.37	8.03	2.22
Medium engagement	33	20.48	17.28	7.92	12.14	11.05	20.31	8.51	2.31
High engagement	107	23.29	17.95	4.59	10.22	12.32	21.28	7.78	2.57

Note. Topic distributions remain relatively stable across engagement levels, suggesting that the content of comment discourse is more strongly shaped by video framing characteristics than by engagement volume alone.

Table E5. LDA Topic Distribution (%) by Emotional Intensity and Party

Category	N	T1	T2	T3	T4	T5	T6	T7	T8
Democratic									
Low intensity	27	26.68	26.37	2.15	13.10	6.58	18.10	5.25	1.75
Medium intensity	71	25.99	23.24	4.18	10.15	6.40	20.35	7.65	2.03
High intensity	91	26.70	19.32	3.92	9.34	8.24	22.66	7.49	2.34
Republican									
Low intensity	15	22.66	18.30	5.01	11.39	10.89	21.83	7.92	2.02
Medium intensity	69	22.84	16.84	6.66	10.78	12.05	19.79	8.69	2.35
High intensity	69	22.64	17.98	5.40	10.34	11.85	21.83	7.24	2.72

Note. High-intensity Democratic videos show modestly elevated Topic 6 proportions (22.66%) compared to low-intensity (18.10%), consistent with the marginal significance of Emotional Intensity in the regression model ($\beta = 0.107, p = .058$).

Appendix F: YPRA Scale Empirical Calibration

This appendix reports the OLS regression results used to empirically calibrate the YouTube Polarization Risk Assessment (YPRA) scale weights, and the resulting scoring categories.

Table F1. OLS Regression Results: Predictors of Comment Polarization (N = 373)

Predictor	β (Standardized)	p-value	Sig.	
Stance Strength	0.355	< .001	Yes	***
Engagement Score	0.198	< .001	Yes	***
Emotional Intensity	0.107	.058	Marginal	†
Mockery Score	0.116	.182	No	
Emo_Anger	0.314	.012	Yes	*
Emo_Humor/Sarcasm	0.350	.001	Yes	**
Emo_Fear	0.044	.727	No	
Emo_Hope	0.089	.418	No	
Model Fit	R² = 0.224	F = 13.13	p < .001	***

Note. Dependent variable: Comment Polarization (ordinal, 1–4). Standardized coefficients (β) reported. Dominant Emotion was dummy-coded with Rationality as the reference category. *** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .10$.

Table F2. Empirically Calibrated YPRA Scale Weights

Risk Dimension	Weight	Empirical Basis	Justification
Political Stance Strength	35%	$\beta = 0.355^{***}$	Strongest predictor of comment polarization; clearly partisan content most robustly associated with polarized comments.
Dominant Emotion	30%	See sub-items	Aggregated weight for emotional impact; humor/sarcasm and anger assigned highest risk scores.
a. Humor/Sarcasm		$\beta = 0.350^{**}$	Key finding: sarcasm drives polarization more than anger, establishing exclusionary in-group boundaries.
b. Anger		$\beta = 0.314^*$	Significant driver of intergroup conflict and hostile comment discourse.
c. Fear/Hope		n.s.	Not statistically significant predictors; assigned low risk scores.
Engagement Level	20%	$\beta = 0.198^{***}$	High-visibility environments are associated with more polarized comment discourse.
Emotional Intensity	10%	$\beta = 0.107^\dagger$	Marginally significant; functions as an amplifier of other polarization drivers.
Partisan Mockery	5%	$\beta = 0.116$ n.s.	Retained for theoretical completeness (Social Identity Theory); low empirical weight.
Total	100%		

Note. Weights derived from normalized standardized regression coefficients. *** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .10$, n.s. = not significant.

Table F3. YPRA Scoring Categories and Risk Thresholds

Dimension (Weight)	Category and Scores
Political Stance Strength (35%)	Pure stance: 9 pts; Leaning stance: 4 pts; Neutral: 1 pt
Dominant Emotion (30%)	Humor/Sarcasm: 10 pts; Anger: 9 pts; Hope/Pride: 5 pts; Fear/Worry: 4 pts; Rationality: 3 pts
Engagement Level (20%)	High (>0.005): 8 pts; Medium (0.001–0.005): 5 pts; Low (<0.001): 2 pts
Emotional Intensity (10%)	High: 10 pts; Medium: 6 pts; Low: 2 pts
Partisan Mockery (5%)	Present: 8 pts; Absent: 2 pts
Risk Thresholds	Low Risk: Weighted Score < 4.0; Medium Risk: 4.0–6.0; High Risk: > 6.0

Note. Scoring updated from initial literature-based scheme to reflect empirically calibrated weights. Humor/Sarcasm score elevated above Anger based on regression finding ($\beta = 0.350$ vs. 0.314).