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Topical Negative Campaigning Under Spatial Pressure: Party-Level Strategies for Attacks Across Multiple Issues

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ABSTRACT

This paper investigates how spatial party competition shapes topical negative campaigning during Germany's 2021 federal election. We define topical negative campaigning as attacks on opponents that target specific policy issues, and spatial pressure as a party's ideological proximity to all relevant competitors on a given issue dimension. We argue that in crowded ideological spaces—where parties hold similar positions on salient issues like the economy and the environment—negative campaigning increases as a strategic means of differentiation. When substance alone fails to create contrast, parties turn to negativity to stand out and sharpen their profile. Using 166,402 tweets from 1228 official party accounts, we examine negative campaigning across four issues: economy, ecology, culture, and COVID-19. Our method combines named entity recognition, stance detection (XLM-RoBERTa-XL), and a dictionary approach. We introduce a novel measure of spatial pressure that captures issue-specific proximity in a multiparty system. Our findings show that higher spatial pressure leads to more negativity on salient and contested issues (economy and ecology), but reduces it on lower-salience or depoliticised topics (culture and COVID-19). This demonstrates that the effect of ideological proximity is conditional on issue context and reveals negativity as a functional response to spatial crowding.

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Introduction

Recent literature highlights a significant increase in attacks against political rivals during election campaigns (Klinger, Koc-Michalska, and Russmann 2023). Although negative campaigning is not new, this surge coincides with the rise of social media platforms (Garzia, Ferreira de Silva, and De Angelis 2021; Mueller and Saeltzer 2022), which enable rich data for detailed,

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even real-time analysis of political attacks. Studies analysing negative campaigning on social media confirm findings from earlier, non-digital research. They show that political actors use negative campaigning strategically to broaden appeal, win over undecided voters, draw votes from close rivals, or mobilise their supporters (Maier, Stier, and Oschatz 2022). Spatial models of party competition, particularly those related to vote-seeking, are insightful for explaining the motivations for negative campaigning (Downs 1957). These models map voters' issue preferences and policy stances onto an abstract spatial field, identifying key voter segments and pinpoint the most effective targets for political attacks (Stueckelberger 2019).

Previous studies on spatially strategic negative campaigning typically examine party competition in a one-dimensional political space (Curini and Martelli 2010; Elmelund-Praestekaer 2008; Ridout and Holland 2010; Walter 2014). This is striking, since the political space is recognised as at least two-dimensional (Kitschelt 1994). Thus, spatial considerations of parties engaging in negative campaigning, including the characteristics and proximities of ideologically adjacent competitors, can vary significantly across issues, making generalisations based on a single-dimensional view oversimplified and potentially misleading.

To address this gap, this paper explores how spatial party competition influences the extent of negative campaigning across four issues: economic, cultural, ecological, and COVID-19. We focus on issue-specific negative campaigning, involving attacks on specific policy issues. These attacks may include factual arguments but also character attacks (Auter and Fine 2016; Nai and Martínez i Coma 2019) targeting an opponent's personal traits, integrity, or overall character in relation to the policy issue. We collected data in real time from the official X/Twitter accounts of seven political parties and their candidates in the Bundestag during the 2021 German federal election, spanning August 01 to September 26, 2021. From this dataset of 166,402 tweets,¹ we used named entity recognition and stance detection – grounded in natural language processing (NLP) – along with a dictionary-based approach.

Central to our analysis is spatial pressure as the main independent variable.² Spatial pressure captures a party's ideological proximity to *all* other relevant parties in a given party system on a specific issue, i.e. the cumulative proximity. Hence, spatial pressure reflects the *overall* ideological density surrounding a party and accounts for the structural difficulty a party faces in distinguishing itself. This systemic view reflects the nature of electoral competition in multiparty systems, where voters are not necessarily constrained to choose between two adjacent parties but may compare multiple alternatives across the issue spectrum. Similarly, parties anticipate this broader evaluative context and respond strategically to the *entire competitive field* (e.g. Adams, Merrill III, and Grofman 2005; Laver 2005; Sartori 1976).

Our theoretical interest, therefore, is not in explaining who a party attacks, but under what conditions parties intensify negative campaigning - namely, when spatial pressure limits their ability to differentiate on policy grounds. To quantify spatial pressure, we introduce a new function, which we apply to data from the Voting Advice Application (VAA) euandi2021 (Reiljan et al. 2023). euandi2021 locates parties on various issues using statements informed by both party input and expert assessments (Garzia, Trechsel, and De Sio 2017).

The 2021 German federal election campaign provides a compelling case for probing negative campaigning across multiple issues using X/Twitter data. First, the shift of the German party system towards polarised pluralism pressures parties to emphasise ideological distinctions (von Beyme 1984), potentially increasing negative campaigning. Second, the 2021 election saw pronounced uncertainty, with multiple parties securing similar polling figures, heightening competition, and urging parties towards negative strategies for differentiation. Finally, the COVID-19 pandemic's challenges to traditional offline campaigns compelled parties to rely more on digital platforms.

Our analysis shows that spatial pressure within the party system increases negative campaigning-but only on salient and contested issues like the economy and ecology. On lower-salience or consensual topics, such as culture or COVID-19, this effect disappears or even reverses. These findings underscore the need to consider both the systemic competitive context and issue-specific dynamics when studying campaign behaviour. By highlighting when and why parties attack, our theory helps explain not just *that* parties compete, but *how* they do so in complex, multiparty systems.

Research Origin and Definition

Political actors have three main goals: winning votes, gaining office, and implementing policies (Strom 1990). During election campaigns, they use various short-term tactics, including persuading undecided voters, mobilising their base, forming alliances, and engaging in positive or negative campaigns. Positive campaigning involves advocating for their agenda, highlighting strengths, and delivering inspiring speeches. Conversely, negative campaigning aims to reduce opponents' support by portraying them negatively and emphasising weaknesses (Polborn and David 2006). The ultimate goal is to convince voters that the opponent is unfit for office, thereby increasing the attacking candidate's or party's chances of winning.

Negative campaigning can take various forms: Scholars distinguish between substantial negative campaigning and unsubstantial 'mudslinging' (Kahn and Kenney 1999), civil and uncivil or dirty campaigning (Reiter and Matthes 2021; Walter and Ridout 2021), as well as character (Auter

and Fine 2016; Nai and Martínez i Coma 2019) and issue attacks (Nai and Maier 2020). These classifications highlight different qualities of negative campaigning but often overlook its primary purpose. In contrast, Thelen (2020) takes an instrumental approach, defining negative campaigning as a deliberate strategy of disseminating information:

about a political opponent with the strategy of bringing his or her weaknesses to the fore. The aim is to cast doubt on the opponent's professional and personal suitability for political office, and thus to emphasise one's own superiority without having to name it explicitly (Thelen 2020, 47).

This definition echoes Geer's (2006) characterisation of negative campaigning as 'any criticism levelled by one candidate against another during a campaign,' (Geer 2006, 23) but refines it by highlighting the underlying motivation. Understanding this motivation is crucial, as electoral attacks can offer strategic advantages but also carry risks, such as backlash effects (Shapiro and Rieger 1992). We therefore conceptualise negative campaigning not as incidental behaviour, but as a deliberate strategic tool. By focusing on the strategic rationale - rather than the tone or intensity of criticism - our approach aligns with existing research (Elmelund-Praestekaer 2010; Grossmann 2012) and enables a more consistent understanding of its function across campaigns. This definition provides a clear analytical foundation for our study, allowing us to explore the core strategic logic behind negative campaigning.

Research on negative campaigning has primarily focused on individual candidate attributes, such as participating in open seat races, having limited campaign funds, or facing attacks (Damore 2002; Lau and Pomper 2001). In Germany's evolving political landscape, particularly with the rise of the far-right AfD, negative campaigning is linked to extreme ideological positions or governing party membership (Giebler and Melcher 2019; Schmücking 2015). However, current research leaves a gap in understanding the strategic rationales behind negative campaigning at the party level.

However, negative campaigning, even by candidates, can be analysed as part of party strategies in Germany, given the significant role parties play in the electoral process. Candidates rely on their parties for nomination and election, despite the personalised proportional representation system. This system combines direct majority voting in one of 299 constituencies with proportional representation through state party lists (*German Länder*). Although candidates have two ways of entering parliament, constituency or list, they require the support of party leadership or the party base to succeed (Reiser 2011). Thus, candidates are incentivised to align with their party's objectives to secure a favourable list position or a 'winnable' constituency.

Research indicates that even constituency candidates in Germany tend to conduct party-centred rather than candidate-centred campaigns (Zittel and

Gschwend 2008). Centralised campaigns dominate, reinforced by two factors: First, parties can nominate a candidate for both the party list and a constituency, promoting a unified party message (Manow and Nistor 2009). Second, increased voting behaviour volatility during election campaigns requires greater party cohesion. As a result, candidates are likely to reflect the party line, making strategic considerations in negative campaigning analysable at the meso-level, the focus of this paper.

Studies investigating negative campaigning use various sources, such as press releases, newspapers, TV debates, advertisements, surveys, and expert evaluations (Haselmayer, Meyer, and Wagner 2017; López Ortega 2021; Maier and Jansen 2015; Nai 2020, 2023; Reiter and Matthes 2021). While valuable, these sources have limitations: they may be static, time-bound, filtered by gatekeepers and subject to editorial scrutiny, and restricted in sample size. In contrast, social media offers dynamic, extensive, and relatively unmediated access to political communication. Its immediacy and interactivity may foster a greater prevalence of negative campaigning, while also enabling both real-time and retrospective analysis of campaign tactics (Müller, Riedl, and Drews 2022).

Platforms like X/Twitter have become central to political communication strategies, allowing parties and candidates to engage quickly and directly with their electorate. However, these platforms are not neutral arenas. Their algorithmic infrastructures create distinct communicative power dynamics: recommendation systems tend to amplify negative and radical content, resulting in an ‘algorithmic negativity bias’ that reinforces affective polarisation. Research shows that highly followed users and marginal accounts alike benefit disproportionately from algorithmic amplification, contributing to an unequal distribution of visibility. This dynamic promotes ideological extremes and diminishes content diversity, further reinforcing political fragmentation.

Recent studies underscore these platform effects. Bouchaud, Chavalarias, and Panahi (2023) find that centre-right users are more frequently exposed to extreme content, while centre-left users encounter slightly more ideologically congruent posts. Chavalarias, Bouchaud, and Panahi (2023) document a broader trend toward amplification of polarising messages, contributing to a fragmented opinion landscape and strengthening controversial actors’ interpretative power. In line with Bail et al. (2018), such dynamics may deepen ideological divisions. Despite these biases, political actors in Germany view X/Twitter as an essential campaign tool evidenced by the significant presence and activity of politicians and parties (Stier et al. 2018). Although the platform’s user base is not representative of the broader electorate, its influence extends beyond its digital boundaries. Journalists routinely incorporate X/Twitter into their reporting (Hermida 2012), and parties use it to shape a cross-media agenda (Harder, Sevenans, and Van Aelst 2017).

Even amid significant platform changes, such as Elon Musk's takeover, journalists have continued to rely on it due to its affordances and professional obligations, making a full migration to alternatives unlikely (Ng and Ray 2025). Consequently, content shared on the platform permeates traditional media and public discourse, making X/Twitter a valuable lens for observing broader party-level campaign strategies, not despite but because of its hybrid role in the contemporary media ecosystem.

Party-Level Strategies to Go Negative

It's Not Only the Economy, Stupid!

Party competition for votes is central to democratic processes and can be modelled as a spatial process. Downs (1957) illustrates programmatic differences between parties as ideological distances, where position changes bring parties closer or push them apart (Laver and Schilperoord 2007). In this model, parties and voters pursue their goals rationally: parties aim to maximise votes (De Sio and Weber 2020), and voters seek to have their preferences reflected in policies. In Downs' (1957) perspective, all voters have single-peaked preferences on a singular left-right ideological spectrum.

While this model effectively represents the US two-party system of the 1950s, it falls short in capturing the complexities of modern political systems. Today's political landscapes are often marked by parliamentary fragmentation and the importance of multiple issues in determining election outcomes. Notably, the traditional economic left-right axis is intersected by another cultural dimension (Kitschelt 1994), known as GAL-TAN (Hooghe, Marks, and Wilson 2002). This bifurcates into two subdimensions – cultural liberal vs. conservative and ecological sustainability vs. economic growth – which we distinguish for two reasons: First, environmental issues have gained substantial prominence, particularly with growing awareness of climate change. During the 2021 German election, environmental topics ranked highly in both surveys and X/Twitter discussions (Infratest dimap 2021; Sältzer and Stier 2022), with the Greens gaining significant votes. Meanwhile, cultural issues (e.g. immigration) played a reduced role in determining the election outcome (Angelucci et al. 2021), particularly compared to the 2017 election (Franzmann, Giebler, and Poguntke 2020). In this context, ecological issues may be considered distinct from cultural issues. Second, Reiljan, Kutiyski, and Krouwel (2020) found that, in principal component analysis using VAA data, ecological statements do not strongly correlate with other cultural statements, underscoring the need to view these subdimensions as separate entities.

Additionally, we introduce a fourth issue: COVID-19. This topic dominated discourse during the 2021 German federal election and presented a

unique challenge (SPARTA 2023). Traditional ideological frameworks struggled to grasp the diverse political implications of the pandemic, as parties balanced individual freedoms and economic interests against health directives (Riedl, Drews, and Richter 2024). Given its significant impact and distinctive nature, we propose that COVID-19 be considered a separate and independent issue in the context of the 2021 German federal election. Therefore, our study examines the political landscape through the lens of four key issues: economic, cultural, ecological, and COVID-19.

Spatial Pressure and Topical Negative Campaigning

In this political space, parties vie for votes based on their policy stances, while voters choose parties that best match their preferences (Downs 1957). However, what matters most is not the actual congruence of parties' positions with voters' preferences, but voters' perceptions of alignment. Recent research shows that parties can significantly shape voters' perceptions of their competitors by distorting policy messages, even influencing their own supporters' views (Somer-Topcu and Tavits 2023). Additionally, Curini (2018) argues that negative campaigning is increasingly used to shift the focus from spatial to valence competition. Rather than critiquing rivals' programmatic positions, parties question their competence in dealing with issues. Thus, topical negative campaigning, whether targeting a specific policy or a party's ability to execute it, can effectively damage a competing party's image.

Negative campaigning becomes significant when voters face multiple party choices, especially when these parties have similar stances on certain issues. In this context, negative campaigning serves as a strategic method to gain visibility and stand out. However, criticising a party with similar stances can backfire by inadvertently undermining one's own position (Curini 2018). Moreover, parties may avoid aggressive tactics against potential post-election coalition partners, limiting the extent and targets of negative campaigning (Haselmayer and Jenny 2018; Walter and van der Brug 2013). In multiparty systems, however, parties are not restricted to attacking only their closest rivals. They might criticise parties further away on the ideological spectrum, bypassing those nearest to them. Thus, parties' positions and the composition of their neighbourhood, such as the number, proximity, and political colours of the rival parties, can vary by issue.

In representative democracies, voters typically make a single choice reflecting their preferences on multiple issues. Consequently, parties articulate positions on various issues in their manifestos, which voters assess holistically (Dalton 2017). However, not all issues resonate equally with voters (Franzmann, Giebler, and Poguntke 2020). For instance, a voter might prioritise a party's stance on climate protection over its economic policies.

Therefore, negative campaigning targeting a specific policy mainly appeals to voters who value that issue, with diminished efficacy for those with different priorities. Thus, a party's decision to launch an attack should be influenced by the group of voters it seeks to connect with, and these groups can vary by issue.

Considering these dynamics, we hypothesise that the intensity of negative campaigning varies across issues, depending on the potential competitive advantage gained and the differing priorities of voters.

To explain the extent to which parties engage in negative campaigning, we use the concept of spatial pressure (Curini 2015). Here, spatial pressure measures the gap between a party's stance on an issue and the positions of all other parties on that issue. The assumption is that parties in the same ideological neighbourhood compete for a similar pool of potential voters. Competition is especially fierce under intense spatial pressure, which arises when parties have closely aligned stances on a specific issue. For example, if a party's position on economic policy is close to its competitors', it faces higher spatial pressure because there is less differentiation between them. Conversely, if a party's position is further from its competitors', it faces lower spatial pressure, with more differentiation. The greater the spatial pressure, the more compelling it becomes for a party to differentiate itself. Our study explores this premise, proposing a hypothesis suggesting a direct relationship between spatial pressure intensity and the likelihood of topical negative campaigning:

H1: Parties experiencing elevated spatial pressure across economic, cultural, ecological, and COVID-19 issues exhibit a stronger inclination for topical negative campaigning.

Spatial Competition in Germany

Germany's political landscape has evolved significantly over the past 50 years. In 1983, the Greens (Die Grünen) entered parliament, placing ecological issues at the forefront (Pappi, Kurella, and Bräuninger 2019). In 2013, the radical-right AfD emerged, initially as a euroskeptical party, later shifting focus to migration during the 2015 refugee crisis (Faas and Klingelhöfer 2019). Both parties reshaped Germany's political space, emphasising ecological and cultural issues. At the federal level, five other parties further nuance electoral competition: the Christian Democrats (CDU/CSU), Social Democrats (SPD), Free Democratic Party (FDP), and the Left (Die Linke).

To map these parties' positions on various issues, studies have used expert surveys (Jankowski et al. 2022) and election manifesto analyses (Debus 2022; Lehmann et al. 2023), among others. While valuable, these methods often capture at most two dimensions of the political spectrum. In contrast, this

paper uses data from the euandi2021 VAA (Garzia, Trechsel, and De Sio 2017), which places parties on multiple issues based on various statements as partial indicators. Each party's position reflects its perceived level of (dis)-agreement with these statements, measured using a five-point Likert-type scale. Thus, a party's position on an issue represents its average score from all relevant issue statements (Reiljan, Kutiyiski, and Krouwel 2020). These stances are informed by inputs from parties and expert opinions, with justifications sourced from election manifestos, party programmes, interviews, and press releases Silva et al. (2023) affirm the validity of euandi's party placements, noting their alignment with other well-established methodologies like CHES and CMP data.

Figure 1 shows the positions of the seven German parties across the four analysed issues. The distribution of parties on economic and cultural issues aligns with prior analyses of the 2017 German federal election (Franzmann, Giebler, and Poguntke 2020). The party order, from left to right, is the Left, Greens, SPD, CDU/CSU, and AfD. Notably, the FDP leans culturally liberal but is positioned farthest to the right economically. On ecological and COVID-19 issues, the AfD starkly contrasts with other parties. While most parties support the Paris Climate Agreement, the AfD denies human-driven climate change. Similarly, on COVID-19, the AfD opposes almost all safety protocols, such as masks and vaccines, while other parties recognise the virus's threat, differing only on specific measures.

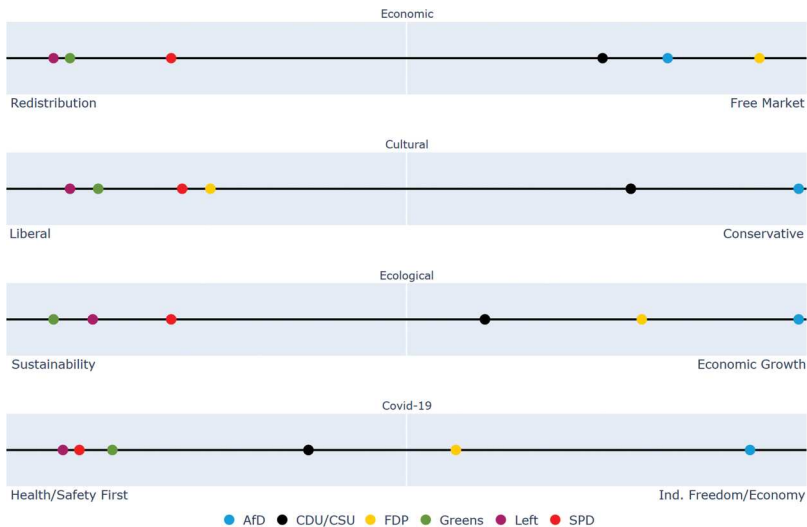


Figure 1. Positions of German Parties on Four Central Issues During the 2021 German Federal Election based on Reiljan et al. (2023).

Materials and Methods

Dependent Variable: Topical Negative Campaigning

To assess the relationship between topical negative campaigning and spatial pressure, we use a cross-sectional time series approach with Poisson regression models. The dependent variable - *topical negative campaigning* or *topical attacks* - is operationalised as the daily number of tweets attacking other parties on specific issues: economic, cultural, ecological, or COVID-19-related. This process begins by identifying the parties and related entities mentioned in a tweet. Each tweet is then examined to determine whether it contains a stance opposing another party (e.g. an attack) or if it conveys a positive or neutral position (not an attack). Finally, tweets are checked to see if they relate to any of the predefined issues. We use NLP techniques, including named entity recognition (NER) and stance detection, supplemented by a dictionary, to pinpoint the relevant issues. This allows us to accurately identify the parties mentioned, the author's stance towards these parties, and the specific issues addressed in a tweet.

We sourced the tweets from official German party accounts with Bundestag parliamentary groups: AfD, CDU, CSU, FDP, the Greens, the Left, and SPD.³ Our scope included tweets from their federal party accounts, parliamentary groups, the CSU state group, available state associations, leading candidates, and Bundestag candidates.⁴ CDU and CSU tweets were grouped to reflect their federal union and united campaign. The tweets were collected in real time during the election campaign. Our dataset spans 57 days (August 01 to September 26, 2021) and comprises 166,402 tweets from 1228 associated party accounts.

The tweets were first analysed using NER to identify the target entities (i.e. political parties), even when not mentioned explicitly. We used a list containing 3000 hashtags (e.g. *#redredgreen* → *Left*, *SPD*, *Greens*), 500 keywords (e.g. *Social Democrats* → *SPD*), 104 X/Twitter handles of party accounts, the names and, where available, X/Twitter handles of 1,840 former and current MPs of the German Bundestag and the state parliament in North Rhine-Westphalia, and those of 300 key political actors. NER achieved a macro F1 score of 0.91 for recognising and assigning these entities to parties.

For stance detection, we employed a multilingual pre-trained transformer model known as XLM-RoBERTa-XL from HuggingFace (Goyal et al. 2021). The model was further pre-trained and fine-tuned on X/Twitter data from two elections: the 2021 German federal election and the 2022 North Rhine-Westphalian state election. To further pre-train the model, we used 8,093,480 unlabelled tweets (excluding retweets) related to the federal election, collected between July 1 and September 26, 2021. Additionally, we included 434,216 unlabelled tweets (excluding retweets) from the state election, collected from January 31 to May 15, 2022. We used the preprocessed

full tweet texts as input to the model and conducted the pre-training on federal election data first, followed by state election data.

For fine-tuning, we used manually coded tweets from both the federal and state election campaigns. For the federal election, we sampled 10,638 tweets (time period: July 1 to August 18, 2021). For the state election, we sampled 13,309 tweets (time period: January 1 to April 4, 2022) and the top 10,775 most-retweeted tweets (time period: March 28 to May 15, 2022). We collected the top 50 retweets mentioning each political party and leading candidate twice per working day for fixed hours since the last collection. In total, we had 34,722 manually labelled tweets for fine-tuning, labelled by three coders with a Krippendorff's alpha of 0.8473, indicating high inter-rater reliability. We used 90 per cent of this data for training and 10 per cent for validation.

Fine-tuning followed an approach originally used for Aspect-Based Sentiment Analysis (Dai et al. 2021): For every named entity in a tweet, the tweet was provided multiple times to the model, which learned to predict using only the embedding of the named entity, rather than the entire tweet. A balanced sample was used for training, but we drew ten different, approximately equal-sized samples to compare the model's performance depending on facilitated data. Using this procedure, we first fine-tuned ten XLM-RoBERTa-XL models on the labelled federal election data, each with one of the balanced samples. We then selected the model with the best macro F1 score on the validation set. We further fine-tuned this model using labelled data from the state election campaign. The initial training of the ten XLM-RoBERTa-XL models took eight epochs, while the final fine-tuning was performed over four epochs. We used a similar training configuration as for the further pre-training phase but included a linear warm-up of 10,000 steps. Our final model achieved an F1 score of 0.88 for tweets featuring attacks versus not featuring an attack.

Table 1 summarises the parties' X/Twitter activity and the number of tweets mentioning and attacking other parties, revealing disparities in activity. The Greens are the most prolific, with 47,679 tweets from 306 accounts. In comparison, CDU/CSU (18,705 tweets, 202 accounts) and

Table 1. Accounts, tweets, mentions, and attacks per party from August 1 until September 26, 2021.

Party	Accounts	Tweets	Tweets mentioning other parties	Tweets attacking other parties
AfD	119	14,468	3225	2654
CDU/CSU	202	18,705	4602	3300
FDP	202	27,714	4912	3330
Greens	306	47,679	11,932	9433
Left	168	29,120	7833	5922
SPD	231	28,716	7282	5260
Sum	1228	166,402	39,786	29,899

AfD (14,468 tweets, 119 accounts) lag behind. Additionally, 76 per cent of the tweets parties produce are about themselves, while 24 per cent address at least one other party. Of those 24 per cent of tweets mentioning other parties, 75 per cent include at least one attack.

To determine whether negative stances towards other parties also highlighted specific issues, we analysed tweets containing such attacks for mentions of economic, cultural, ecological, and COVID-19-related terms. For this, we developed a dictionary containing 910 terms, grouped into four categories based on the policy fields they represented: 397 economic terms, 193 cultural terms, 147 ecological terms, and 173 COVID-19 terms. The dictionary was developed and continuously expanded through daily updates, informed by in-depth press reviews and ongoing monitoring of public discourse on X/Twitter between July 1 and September 26, 2021. To evaluate the reliability of our dictionary, we manually reviewed a random sample of 250 tweets from our database that had not been assigned a topic. The results indicate that 96 per cent of the tweets were accurately categorised according to their intended policy topic, meaning the assigned labels reflected the substantive content of the tweets. In just 4 per cent of cases, we identified false negatives—instances where a relevant term appeared in the text and clearly related to a topic, but was not yet included in the dictionary. This high level of precision highlights the robustness of our dictionary-based approach in capturing issue-specific political communication.

Using this dictionary, we counted whether the terms appeared in tweets and matched them to the topic(s) they addressed. Our four dependent variables then illustrate the daily number of tweets expressing negative stances against other political parties and mentioning economic, cultural, ecological, or COVID-19-related terms, respectively. [Tables 2 to 5](#) summarise the number of tweets containing topical attacks.

Economic and ecological negative campaigning dominated, suggesting these issues likely structured party competition in the 2021 federal election. With 5,996 tweets, economic attacks were the most prevalent. This prominence aligns with the election outcome, where the economy played a pivotal role. The SPD's win was notably influenced by its credible stances

Table 2. Economic attacks (number of tweets).

	Attacking party						Sum
	AfD	CDU/CSU	FDP	Greens	Left	SPD	
AfD	0	6	7	13	41	19	86
CDU/CSU	93	0	225	602	588	709	2,217
FDP	13	3	0	103	392	45	556
Greens	77	276	203	0	128	33	717
Left	26	111	59	5	0	5	26
SPD	93	625	429	692	375	0	2,214
Sum	302	1,021	923	1,415	1,524	811	5,996

Table 3. Cultural attacks (number of tweets).

	Attacking party						Sum
	AfD	CDU/CSU	FDP	Greens	Left	SPD	
AfD	0	14	15	16	23	12	80
CDU/CSU	160	0	63	378	214	98	913
FDP	35	1	0	23	32	8	99
Greens	106	65	42	0	74	27	314
Left	50	21	12	7	0	1	91
SPD	64	77	40	154	87	0	422
Sum	415	178	172	578	430	146	1919

Table 4. Ecological attacks (number of tweets).

	Attacking party						Sum
	AfD	CDU/CSU	FDP	Greens	Left	SPD	
AfD	0	13	1	15	18	9	56
CDU/CSU	21	0	28	911	259	146	1365
FDP	4	79	0	91	98	10	282
Greens	42	49	76	0	103	36	306
Left	3	2	5	6	0	1	17
SPD	12	24	15	848	92	0	991
Sum	82	167	125	1871	570	202	3017

Table 5. COVID-19 attacks (number of tweets).

	Attacking party						Sum
	AfD	CDU/CSU	FDP	Greens	Left	SPD	
AfD	0	9	3	12	11	35	70
CDU/CSU	155	0	73	202	140	153	723
FDP	20	6	0	22	31	10	89
Greens	35	33	32	0	19	28	147
Left	19	15	10	2	0	0	46
SPD	75	60	58	81	43	0	317
Sum	304	123	176	319	244	226	1392

on traditional left-wing priorities, such as minimum wage hikes and bolstering labour protection. The Greens, emphasising social justice and higher taxes on the wealthy, also saw increased support (Angelucci et al. 2021). Their overlapping agendas hint at potential coalition inclinations. However, as both the SPD and the Greens championed core issues of the Left, this compelled the Left to distinguish itself, leading to heightened economic attacks. Moreover, since voters can more readily evaluate a government's economic performance,⁵ the then-ruling CDU/CSU and SPD parties faced frequent economic critiques.

Ecological attacks were also prominent, accounting for 3,017 tweets – 62 per cent of which were initiated by the Greens. This trend is striking, as issue owners usually convey their issues positively (Elmelund-Praestekaer 2011). However, the Greens faced intensifying competition from other parties addressing

climate concerns.⁶ Amid this heightened competition, the Greens attacked to affirm their dedication to climate change and claim issue ownership.

Cultural and COVID-19-related criticisms were less prevalent, with only 1919 and 1392 tweets, respectively. Several factors might explain this trend. First, cultural matters did not significantly sway the election outcome, making them a less appealing avenue for party criticism (Angelucci et al. 2021). Additionally, the urgency of the COVID-19 health crisis eclipsed cultural issues. For instance, during the 2021 campaign, cultural topics were not among the top ten most discussed issues in the German election discourse on X/Twitter, while COVID-19 dominated the conversation (SPARTA 2023). Finally, given the delicate and emotional nuances surrounding COVID-19, parties avoided aggressive positions that might alienate voters, leading to a tempered discourse on the topic (Riedl, Drews, and Richter 2024).

Independent Variable: Spatial Pressure

The measure of the independent variable - *spatial pressure* - is derived from party policy positions across the four issues highlighted by euandi2021 (see Figure 1). Spatial pressure estimates the programmatic distance a party has *relative to all other parties*, introducing a novel measure that captures the breadth of variation in policy positions within an issue.

Our approach builds upon previous methods to quantify spatial pressure, notably Curini (2015). However, Curini's (2015) method calculates spatial pressure by looking only at the political parties immediately to the left and right of a given party. This approach could be biased towards extreme parties, as they have only one neighbouring party, and may not be accurate in multi-party systems where a party can have several rivals with similar policy positions. Additionally, this method struggles in measuring spatial pressure when two parties have the same position on a certain issue. To address this, we developed a function based on three requirements:

- (1) The metric for spatial pressure a given party faces should be scaled into the interval [0, 1].
- (2) Spatial pressure should increase as more parties exert pressure on a given party, surpassing even the maximum pressure from pairs of two parties.⁷
- (3) The number of parties potentially exerting spatial pressure should not be limited to a certain amount.

We begin by defining a function $f(A, B)$ for a pair of parties A and B that represents the spatial pressure of B on A (or vice versa from A to B), but only for the specific pair (A, B) . A also represents the score value of party A for a particular issue. Here, $d(A, B) = |A - B|$ is the distance between the policy

Table 6. Exponential spatial pressure across four issues.

	Economy	Culture	Ecology	COVID-19
AfD	3.4725×10^{-3}	3.6137×10^{-7}	9.5368×10^{-7}	5.1449×10^{-12}
CDU/CSU	3.1738×10^{-3}	3.6137×10^{-7}	9.5368×10^{-7}	2.2228×10^{-9}
FDP	3.0153×10^{-4}	8.2518×10^{-2}	1.9073×10^{-6}	2.1910×10^{-9}
Greens	1.7692×10^{-1}	8.3066×10^{-2}	3.1280×10^{-2}	6.6410×10^{-2}
Left	1.7680×10^{-1}	8.2518×10^{-2}	3.2196×10^{-2}	2.4299×10^{-1}
SPD	2.0315×10^{-4}	8.3066×10^{-2}	1.0071×10^{-3}	2.7498×10^{-1}
Mean	6.0727×10^{-2}	4.1386×10^{-2}	1.0468×10^{-2}	9.7397×10^{-2}

Values rounded to four decimal places.

positions of parties A and B , where the policy positions are measured on a scale ranging from $[-50, 50]$, according to euandi2021. Thus, the distance $d(A, B)$ can range between 0 and $100 = 50 - (-50)$.

Using the distance $d(A, B)$ with an exponential function of the form

$$f(A, B) := \alpha^{-d(A, B)} = \frac{1}{\alpha^{d(A, B)}} \quad \text{for some } \alpha > 1$$

we can scale the range of spatial pressure into the interval $[0, 1]$ and satisfy the first requirement. We take this function f as a model to determine pairwise spatial pressure $f(A, B)$.

Next, we take the following step-wise approach to motivate the function h : If we fix a party A , the first step is to model spatial pressure from a single party B onto A (see function f above). The second step is to model spatial pressure from a set of parties $B_1, \dots, B_n$ onto A .⁸ Thus, we define:⁹

$$h(A; B_1, \dots, B_n) := 1 - (1 - f(A, B_1)) \cdot \dots \cdot (1 - f(A, B_n)).$$

To simplify notation, we write $h(A)$ or h_A , if for the constituent parties $B_1, \dots, B_n$ we consider the set of all parties in a party system.¹⁰

Table 6 displays spatial pressure scores for each party in the four issues, using a function with a scaling parameter $\alpha = 2$. The values, expressed to four decimal places, are exponential. This function highlights that spatial pressure is highest regarding COVID-19, particularly for the Greens, the Left, and the SPD. The AfD's spatial pressure for COVID-19 is the lowest, both in its own context and compared to other issues. In terms of mean spatial pressure, the economy ranks second, followed by culture and then ecology. Economically, the Greens and the Left experience the most spatial pressure; culturally, this pressure extends to the FDP, Greens, Left, and SPD, while on the ecological dimension, it is particularly pronounced for the Greens and Left.

Control Variables

In our models, we include controls and address potential confounders:

- (1) *Daily Issue Emphasis and Salience*: We account for daily issue emphasis by all parties and the prevailing issue salience within the German-

language Twittersphere, which may reflect exogenous events or controversies that elicit party responses. These controls are derived from the previously mentioned issue dictionary. To gauge daily issue salience, we analysed 13,347,393 tweets referencing the 2021 German federal election from August 01 to September 26, 2021.

- (2) *Discourse Intensity and Backlash Mitigation*: Backlash effects may be less pronounced during heightened negativity in general discourse or when responding to prior attacks. To address this, we incorporate the daily count of topical attacks by all other parties and the aggregate daily attacks a party endures. We also include a dummy for party status - opposition or government - as suggested by the literature (Maier and Nai 2021).
- (3) *Weekend Activity*: Given the dip in party tweets during weekends, we include a control for weekends (Ceron, Curini, and Drews 2022).
- (4) *Major Campaign Events*: We adjust for days marked by significant campaign-related media events, such as TV debates among candidates, as these typically amplify political discourse (Jungherr 2014).
- (5) *Election Countdown*: Recognising the timing of attacks as pivotal, we log the days remaining until the election.
- (6) *Party X/Twitter Activity*: To reflect varied X/Twitter engagement among parties, our models include the total daily tweet count for each attacking party.
- (7) *Issue Ownership by the Greens*: We include a dummy for the Greens on ecological issues to account for their strategy of emphasising climate change through attacks amid heightened competition.

Results of Poisson Regression Models for Spatial Pressure

Table 7 provides detailed insight into the validation of our hypothesis. These findings support H1 for economic and ecological attacks. When parties experience significant spatial pressure and show minimal programmatic distinction from others in the realms of economy and ecology, they tend to increase the number of daily tweets containing attacks on these topics. The effect is especially strong for ecological attacks ($\beta = 41.414$, $p \leq 0.001$) and remains statistically significant, though less pronounced, for economic attacks ($\beta = 3.220$, $p \leq 0.001$). These results indicate that spatial proximity in highly salient, contested areas incentivises parties to differentiate themselves through negative campaigning.

In contrast, H1 is not supported for cultural and COVID-19-related attacks. Here, we observe a significant negative relationship between spatial pressure and attack volume (Culture: $\beta = -5.145$, $p \leq 0.001$; COVID-19: $\beta = -0.828$, $p \leq 0.01$). These findings are not anomalies but

Table 7. Poisson regressions of daily topical attacks.

	Model 1: Economy	Model 2: Culture	Model 3: Ecology	Model 4: COVID-19
H1: Spatial pressure	3.220*** (0.251)	-5.145*** (0.813)	41.414*** (2.777)	-0.828** (0.316)
Issue emphasis	-0.000 (0.000)	-0.001 (0.001)	-0.000 (0.000)	0.000 (0.001)
Issue salience	0.000*** (0.000)	-0.000* (0.000)	0.000*** (0.000)	0.000 (0.000)
Attacks by all other parties	0.003*** (0.001)	0.035*** (0.003)	0.015*** (0.001)	0.032*** (0.002)
Attacks received	0.004*** (0.001)	-0.007 (0.004)	-0.007** (0.002)	-0.046*** (0.006)
Opposition	-0.167** (0.523)	0.667*** (0.085)	-0.425*** (0.113)	-0.180 (0.092)
Weekends	-0.233*** (0.052)	-0.103 (0.061)	-0.333*** (0.059)	-0.304*** (0.085)
TV debates	-0.010 (0.050)	-0.271** (0.087)	-0.155* (0.076)	0.053 (0.102)
Days until election	0.042 (0.028)	0.062 (0.037)	0.036 (0.031)	0.100* (0.049)
Total number of tweets	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
Green party attack			0.934*** (0.071)	
Constant	0.901*** (0.161)	0.118 (0.149)	-0.168 (0.146)	0.024 (0.197)
Observations	342	342	342	342
Pseudo R^2	0.501	0.250	0.632	0.280
AIC	3104.929	1826.153	1930.022	1670.622
BIC	3147.112	1868.335	1976.04	1712.805
Log likelihood	-1541.465	-902.076	-953.011	-824.311

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

reflect important boundary conditions of the theory: spatial pressure alone does not universally lead to negative campaigning. Rather, the effect is contingent on issue salience, polarisation, and strategic considerations.

Both cultural and COVID-19-related attacks were of comparatively low salience during the 2021 campaign. On cultural issues, ideological clustering reduced opportunities for attack: four parties (The Left, Greens, SPD, FDP) were largely aligned on liberal positions, while CDU/CSU and AfD occupied conservative positions. Despite minor intrabloc differences (e.g. drug policy or inclusive language), the overall alignment dampened incentives for negative engagement. On COVID-19, the AfD diverged sharply from all other parties by rejecting most preventive measures. However, rather than escalating conflict, mainstream parties pursued a depoliticisation strategy, promoting unity and avoiding divisive debates.

Robustness checks support this interpretation: when excluding the AfD from the analysis (see Appendix), the direction and significance of the spatial pressure coefficients for economy, culture, and ecology remain stable, while the effect for COVID-19 disappears entirely. This pattern

suggests that the AfD's distinct mobilisation around the pandemic drove the aggregate result.

Thus, the absence of positive effects for these issues does not undermine the theoretical model; it clarifies its scope. Our results suggest that spatial pressure can drive negative campaigning, but only under specific conditions - namely, when issues are salient, contested, and not subject to strategic depoliticisation or broad consensus. This qualification enhances the explanatory power of the theory by showing *when* and *why* spatial competition translates into confrontational campaign behaviour.

Conclusion

This study offers new insights into the dynamics of topical negative campaigning during the 2021 German federal election, focusing on economic, cultural, ecological, and COVID-19-related issues. By introducing a novel measure of spatial pressure - quantifying ideological proximity across the full party system - we demonstrate that the relationship between spatial pressure and negative campaigning is not uniform but issue-dependent. The impact of spatial competition is shaped by the salience of specific issues, the structure of ideological conflict, and broader strategic goals of the parties.

Our findings show that increased spatial pressure corresponds with a rise in negative campaigning on economic and ecological issues. In these domains, parties with overlapping electoral bases are more likely to engage in attacks to assert distinctiveness and prevent voter defection. Conversely, spatial pressure is associated with less negative campaigning on cultural and COVID-19-related issues. This is not a contradiction, but rather a boundary condition of our theoretical model. These issues were either of lower salience, characterised by broad intra-bloc consensus, or strategically depoliticised by mainstream parties (Angelucci et al. 2021; Riedl, Drews, and Richter 2024) - highlighting that spatial pressure only leads to attack-oriented campaigning when the issue context permits or demands it. Robustness checks further underline these conclusions: when excluding the AfD, the results for economy, culture, and ecology remain stable, while the COVID-19 effect disappears entirely. This finding highlights the AfD's exceptional role in politicising the pandemic, while confirming that the broader patterns are not driven by any single party.

These results contribute to the literature on spatial party competition and political communication by underlining the importance of issue-specific analysis and by adopting a holistic view of the party system. Rather than treating negative campaigning as a general phenomenon, our findings emphasise that electoral strategies must be understood in relation to the structure and salience of specific issues within the broader competitive

landscape. This systemic perspective advances the measurement of competitive pressure in multiparty systems and offers a transferable framework for future research on party behaviour and campaign strategy.

Naturally, our study has limitations. It focuses on a single electoral context – Germany – whose proportional representation system, political party structure, and media environment may not generalise to other democracies. While our current approach treats all parties equally in the calculation of spatial pressure, we acknowledge that in other political contexts, party-specific characteristics such as size, visibility, or institutionalisation may modulate how spatial proximity is experienced. However, in the 2021 German federal election, this concern was less pronounced: all parties included in the analysis had parliamentary representation, national visibility, and professionalised campaigns, and even parties in government (e.g. CDU/CSU and SPD) engaged in direct competition with one another on key issues such as economic policy. Furthermore, our analysis captures only one election cycle and cannot account for longitudinal dynamics of campaigning strategies over time. Nonetheless, the mechanisms we identify – particularly the conditional effect of spatial pressure – may travel to other systems marked by fragmented competition, digital campaigning, and polarised pluralism (von Beyme 1984). Future research should test these dynamics in other settings and across multiple election cycles.

Moreover, While our approach focuses on when parties increase negativity in response to spatial competition within the party system, future research could complement this by examining who is targeted in such attacks, i.e. by incorporating dyadic relations and measuring ideological distance between specific party pairs. This would allow researchers to explore whether parties under pressure from a specific ideological neighbour are more likely to attack that particular competitor.

While our findings emphasise the role of spatial pressure in shaping topical negative campaigning, it is also important to acknowledge the decentralised nature of digital campaigning. Social media platforms are dynamic and reactive spaces where communication is often personalised and situational. Individual party accounts – even within the same organisation – may vary in tone, intensity, and the frequency of attacks, influenced by algorithmic incentives, campaign events, and performative pressures. Furthermore, there is rarely a publicly articulated, top-down strategy for negative campaigning. However, this lack of centralised coordination does not negate the presence of overarching strategic logic. Instead, systemic pressures – such as the need to distinguish oneself in crowded ideological space – manifest in consistent, aggregate-level patterns of online negativity. What appears fragmented at the micro level is often structured at the macro level.

Indeed, a key finding of our analysis is that some campaign fundamentals endure across platforms. The economy, for instance, remains the most prominent issue in both online and offline discourse. This suggests that issue salience continues to structure electoral conflict, even in a fragmented digital landscape. Our results thus speak to the interplay between structural constraints and decentralised communication: parties adapt their strategies within fluid digital environments, but they do so in ways that reflect broader competitive pressures in the party system.

Notes

1. In the following, we refer to both tweets and retweets as ‘tweets’.
2. See Curini (2015) for a previous application of this concept.
3. We excluded those with only one MP, i.e. *Südschleswigscher Wählerverband* and *DIE PARTEI*.
4. Candidate X/Twitter handles were derived from Sältzer et al. (2021).
5. This is evident in the trend where governments synchronise beneficial economic policies with election cycles, as discussed in debates on political budget and election cycles Lagona and Padovano (2008).
6. The Left prominently highlighted climate change, rallying behind the slogan ‘climate protection with social justice.’ Even the CDU/CSU, typically distant in ecological stances, formed a ‘future team’ committee, prioritising challenges like climate change.
7. Note: The function we defined allows to not only compare the entire pressure $h(A)$ on A (from all parties) with the maximum of pairwise pressures $\max(f(A, B_1), \dots, f(A, B_n))$, but also with the pressures determined by any subset of parties.
8. This is a generalisation of the first step, as for $n = 1$ it holds $h(A; B) = f(A, B)$.
9. Note: For $n = 1$, it holds that $h(A; B) = f(A, B)$, so that the model in this second step is indeed a generalisation of the model in the first step.
10. This set also contains party A and the factor $1 - f(A, A) = 1$. In case that two different parties have exactly the same value $A = B$, then $f(A, B) = 1$, which is the maximal pressure one can attain.

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Data Availability Statement

The data supporting the findings of this study are not publicly available due to restrictions from third parties and concerns over compromising the privacy of research participants.

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Appendix. Robustness Checks: Poisson Regressions Excluding AfD

Table A1. Poisson regressions of daily topical attacks excluding AfD.

	Model 1: Economy	Model 2: Culture	Model 3: Ecology	Model 4: COVID-19
H1: Spatial pressure	1.722*** (0.258)	−5.384*** (1.582)	37.470*** (3.306)	−0.119 (0.349)
Issue emphasis	−0.000 (0.000)	−0.000 (0.001)	−0.000 (0.000)	−0.000 (0.001)
Issue salience	0.000*** (0.000)	−0.000** (0.000)	0.000*** (0.000)	−0.000 (0.000)
Attacks by all other parties	0.003*** (0.001)	0.035*** (0.004)	0.016*** (0.001)	0.036*** (0.003)
Attacks received	0.003*** (0.001)	−0.007 (0.005)	−0.008** (0.002)	−0.048*** (0.006)
Opposition	0.126* (0.055)	0.657*** (0.099)	−0.318* (0.125)	−0.348*** (0.099)
Weekends	−0.191*** (0.043)	−0.092 (0.069)	−0.331*** (0.060)	−0.450*** (0.103)
TV debates	−0.002 (0.052)	−0.359*** (0.103)	−0.129 (0.077)	0.005 (0.118)
Days until election	0.053 (0.028)	0.098* (0.043)	0.008 (0.032)	0.067 (0.057)
Total number of tweets	0.000*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
Green party attack			0.970*** (0.073)	
Constant	0.839*** (0.167)	0.025 (0.182)	−0.042 (0.147)	−0.071 (0.225)
Observations	285	285	285	285
Pseudo R^2	0.507	0.255	0.631	0.370
AIC	2628.483	1546.067	1718.926	1239.948
BIC	2668.661	1586.245	1762.756	1280.125
Log likelihood	−1303.242	−762.034	−847.463	−608.974

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.