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Beyond Valence: Arousal as a Core Dimension of Affective Polarization

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Abstract

Although affective polarization is fundamentally an affective construct, existing theories and measures focus almost exclusively on evaluative valence, largely overlooking emotional arousal. Building on the Circumplex Model of Affect, we develop and evaluate a two-dimensional framework of affective reactions toward political parties and affective polarization that incorporates emotional valence and arousal. Across three studies conducted in the Netherlands ($N = 984$), the United Kingdom ($N = 1,001$), and the United States ($N = 1,000$), we show that feeling thermometers function as measures of valence and that valence and arousal represent empirically distinct dimensions of affective reactions. We then demonstrate that the level of emotional arousal provides incremental validity over traditional, valence-based measures of affective polarization, yielding additional and often stronger associations with key political correlates such as political engagement, ideological extremity, and democratic attitudes. These findings advance the conceptualization and measurement of affective polarization by incorporating arousal as a distinct dimension and clarifying when and why affective polarization is most strongly linked to political behavior and democratic attitudes.

Introduction

Affect has long been recognized as central to political reasoning and decision making (Lodge and Taber 2013; Zaller 1992; Webster and Albertson 2022; Bakker, Schumacher, and Rooduijn 2021). More recently, scholars have focused on affective polarization, the widening gap between positive feelings toward political ingroups and negative feelings toward outgroups (Iyengar et al. 2019; Iyengar and Krupenkin 2018; Lelkes 2016). A central claim is that *affect* rooted in social identities offers a valuable lens for understanding contemporary politics (Iyengar, Sood, and Lelkes 2012; Wagner 2024; Huddy 2001). Existing approaches to affective polarization have almost exclusively focused on emotional valence, typically using feeling thermometers that capture positive versus negative feelings towards political actors (Druckman and Levendusky 2019; Krupnikov and Ryan 2022). Yet, theories of affect in psychology treat affect as inherently multidimensional (Schiller et al. 2024; Scherer 2024; Bakker and Lelkes 2024; Russell 1980). Restricting conceptualizations of affect in politics to valence is insufficient, because affective states also vary in arousal, the degree to which they are calm or mild versus active or intense (Russell 2003; Kuppens et al. 2013; Wundt 1924). This is problematic because affective polarization is often invoked to explain why citizens are energized to engage in politics, protest, or reject democratic norms, whereas standard measures only capture how much they like or dislike political groups, not how emotionally activated they are.

Neglecting emotional arousal risks obscuring important variation in people's responses to politics (Bakker, Schumacher, and Rooduijn 2021; Bakker and Lelkes 2024). Two individuals may both dislike an opposing party (and like their political ingroup) to a similar extent, yet differ markedly in how emotionally activated they are, when thinking about both groups. This matters because affective states with similar valence can produce divergent behavioral responses (Bakker and Lelkes 2024; Broockman, Kalla, and Westwood 2023): arousal signals urgency and importance, potentially amplifying or even reshaping the effects of valence on attention, information processing, memory, and decision-making (Storbeck and Clore 2008; Soroka et al. 2019). High-arousal emotions such as anger can fuel political protest, while low-arousal emotions such as sadness may prompt disengagement (Valentino et al. 2011). Failing to distinguish between high- and low-arousal states can therefore help explain apparent inconsistencies or null findings in studies linking affective polarization to other political outcomes (Broockman, Kalla, and Westwood 2023; Bakker and Lelkes 2024).

In this paper, we develop and assess a theoretical model of affective polarization based on the Circumplex Model of Affect (Russell 1980; Barrett and Russell 1999), integrating arousal as a core dimension of affective reactions toward political actors. Using data from the Netherlands, the UK, and the US, we proceed in four steps. First, we evaluate whether feeling thermometers capture emotional valence. Second, we test whether valence and arousal constitute distinct dimensions of party-related affect and examine their functional relationship. Third, we assess how discrete emotions toward political parties map onto the valence-arousal space. Finally, we test whether incorporating arousal improves the validity of affective polarization metrics when examining their associations with commonly studied political correlates. We show that affective reactions toward political parties, and affective polarization more broadly, are more comprehensively described when both valence and arousal are taken into account, and that arousal provides incremental validity beyond valence in assessing relationships with often studied correlates such as political participation, political sophistication, and political news consumption.

By integrating arousal, our framework brings research on affective polarization into closer alignment with contemporary theories of affect. In doing so, it enhances the construct validity of existing measures and clarifies how different dimensions of affective polarization relate to key political behaviors and attitudes. Whereas recent work has either called in general terms for richer affective concepts (Bakker and Lelkes 2024; Halperin et al. 2024) or focused on specific discrete emotions toward outgroups (Scheve 2024; Berntzen, Kelsall, and Hartevelde 2022), we embed affective polarization within a well-established Circumplex Model and show how valence and arousal jointly structure party evaluations and their political consequences across three national contexts. Our approach complements recent proposals to expand the concept (Campos and Federico 2025), but centers on affective reactions toward the full array of relevant political groups rather than primarily focusing on specific in-outgroup dynamics and outgroup aversion in particular (Campos and Federico 2025; Finkel et al. 2024).

Affective Polarization: Current Theoretical Conceptualization and Measurement

Political polarization typically refers to the distribution of attitudes or identities in a population, ranging from relatively unimodal to sharply divided camps (Lelkes 2016; Iyengar, Sood, and Lelkes 2012). In practice, however, scholars often apply the term at the individual level to describe how citizens evaluate political actors. We follow this convention and use affective polarization to denote the extent

to which individuals report warmer feelings toward political ingroups than toward outgroups (Wagner 2021; Iyengar and Wagner 2025): some citizens clearly like “their” party and dislike its rivals, whereas others hold more uniform feelings across parties.

Research on affective polarization often highlights the centrality of *affect*. The concept was originally presented as emphasizing “affect, not ideology” (Iyengar, Sood, and Lelkes 2012), and subsequent work frequently characterizes affective polarization through hostile out-party emotions (Iyengar and Westwood 2015; Iyengar, Sood, and Lelkes 2012; Hartevelde, Mendoza, and Rooduijn 2022; Gidron, Sheffer, and Mor 2022). Empirically, research on affective polarization has operationalized affect almost entirely through self-reported evaluations of parties and their supporters. Feeling thermometers and related items ask respondents how positively or negatively they feel about political actors such as parties or their voters, and are best understood as capturing conscious evaluative judgments rather than momentary visceral reactions (Bakker, Schumacher, and Rooduijn 2021; Druckman and Levendusky 2019; Iyengar, Sood, and Lelkes 2012; Arceneaux and Bakker 2025; Russell 2017).¹

Building on Social Identity Theory (Huddy 2001; Tajfel 1974), which holds that individuals are motivated to evaluate their ingroups positively and outgroups negatively, affective polarization is then typically calculated by contrasting the evaluations of political in- and outgroups. In two-party systems, one can simply take the difference between in-party and out-party ratings (Iyengar, Sood, and Lelkes 2012); in multiparty systems, researchers compute the distribution of like and dislike ratings across parties (Wagner 2024; Reiljan et al. 2023). In what follows, we take the existing theoretical framework and measurement tradition as a starting point and extend it by incorporating variation in emotional arousal alongside valence.

A Two-Dimensional Model of Affective Reactions and Affective Polarization

The Circumplex Model of Affect represents affective experiences in a two-dimensional space, where valence captures the hedonic quality (pleasant/positive vs. unpleasant/negative) and arousal captures its intensity (calming/mild vs. activating/intense) as conceptually distinct dimensions (Russell 1980; Schiller et al. 2024)². Emotions and moods can be located within this space by their combination

¹Our argument does not deny the importance of more automatic affective responses, but focuses on the evaluative, self-reported component that underlies existing measures.

²Although there have been discussions about adding a third (power) and even a fourth (novelty) dimension to the model, we limit ourselves to the first two, given that they explain most of the variance in people’s affective experiences (Fontaine et al. 2022).

of valence and arousal (Russell 2003). It is a widely used model of affect because its structure is consistent across cultures and captures much of the variation in people's self-reported feelings, while offering a simple, generalizable framework to describe affect (Fontaine et al. 2022; Russell 1980).

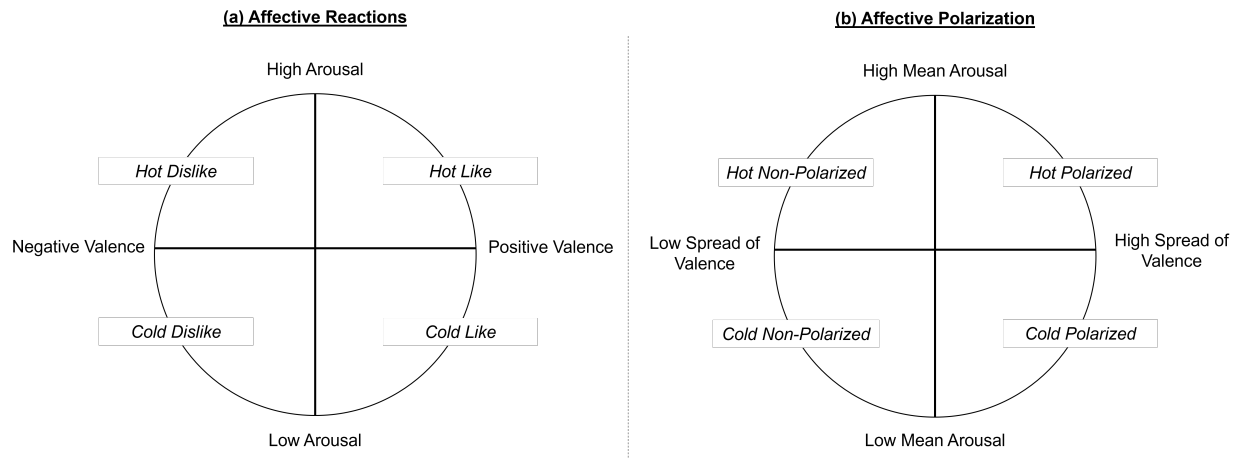
We apply this framework to affective reactions to political actors, and, by extension, affective polarization based on those reactions (Figure 1). Model (a) represents the affect people experience when evaluating individual political groups. Individuals can experience negative or positive feelings (or dislike vs. like)³ toward different political actors, and the level of emotional intensity/arousal when thinking about them can vary from mild (cold) to intense (hot), largely independent of the attached valence. Similar to positive and negative evaluations, we view arousal as a continuously updated affective response that is stored in long-term memory and expressed in context-dependent ways (Laustsen and Petersen 2020; Lodge, McGraw, and Stroh 1989). For example, two right-wing parties with comparable ideological stances might both be similarly disliked by a left-leaning respondent, but only the electorally relevant party elicits high arousal. Likewise, two individuals with similar ideological leanings might like/dislike the same parties to a similar degree, but the more politically engaged respondent may be more emotionally activated by them. Arousal thus adds a second, independent layer to understanding affective reactions that would not be detectable with a purely valence-based approach (see Table 1, RQ2).

Model (b) extends this logic to a theoretical model of affective polarization based on valence and arousal. Here, the horizontal axis represents the degree to which individuals differentiate in valence between political in- and outgroups (non-polarized vs. polarized). The vertical axis represents mean arousal, the overall intensity of feelings across the political groups (cold vs. hot). While measures of dispersion are appropriate for the valence dimension, which is meant to assess the polarity in expressed feelings across the political spectrum, they are not suitable for arousal. The arousal dimension is intended to assess whether or not someone is emotionally aroused when engaging with politics, regardless of the direction of their feelings. Using a dispersion-based score for arousal would be misleading, as it would assign identical scores to individuals who are experiencing consistently high or low emotional arousal across all political groups, failing to capture their level of emotional engagement. A two-dimensional account allows us to identify citizens who are classified as non-polarized on traditional valence-based metrics, such as those who dislike all parties, but who are nonetheless highly aroused

³We use positive/negative valence and like/dislike interchangeably and demonstrate their equivalence empirically (see Table1, RQ1).

when thinking about politics (Versteegen, Phillips, and Mason 2025). Moreover, it can distinguish between individuals with polarized party evaluations, who hold these preferences with stronger or weaker levels of emotional activation. In the remainder of the paper, we show that separating valence and arousal in this way improves the measurement of affective polarization and clarifies when it is most closely linked to political attitudes and behavior (see Table 1, RQ4–RQ6).

Figure 1: Circumplex Models of Affective Reactions & Affective Polarization



Note. (a) The Circumplex Model of Affective Reactions; (b) The Circumplex Model of Affective Polarization. Although we show four quadrants in both panels for illustrative purposes, the underlying axes of affective reactions and affective polarization are continuous dimensions.

Another response to critiques of the uni-dimensional, valence-based measures has been to assess discrete emotions toward political (out-)groups, such as anger, fear, disgust, or disappointment (Scheve 2024; Halperin et al. 2024; Berntzen, Kelsall, and Harteveld 2022). While this represents a valuable advance, our two-dimensional framework offers several advantages. Many discrete emotions can be located within the valence-arousal space (Fontaine et al. 2022), allowing us to place them within a generalizable structure. Our framework is also more parsimonious, requiring only two judgments rather than multiple ratings for each emotion per party. This is an important consideration in multiparty systems and population-based surveys where time and space are scarce. Finally, conceptualizing affective polarization via valence and arousal enables the computation of aggregate metrics across multiple political groups, which is central to the definition of polarization as variation across distinct poles, rather than focusing solely on outgroup emotions as a common way to integrate discrete emotions (Berntzen, Kelsall, and Harteveld 2022; Kretchner et al. 2024). Moving beyond these conceptual points, we compare our approach empirically with the discrete emotions approach below (see Table 1, RQ3/RQ7).

We use data from the Netherlands, the UK, and the US to evaluate our proposed two-dimensional theoretical framework of affective polarization and affective reactions toward political actors. We address the research questions outlined in Table 1. Specifically, RQ1-3 focus on the Circumplex Model of Affective Reactions (Model A, Figure 1). We analyze the extent to which feeling thermometers capture emotional valence, the functional relationship between valence and arousal in reactions to political parties, and how discrete emotions map onto the two dimensions. For RQ4-7, we turn to the Circumplex Model of Affective Polarization (Model B, Figure 1) testing whether arousal adds incremental validity beyond valence in assessing relationships with relevant political correlates and comparing the sign and magnitude of associations across approaches.

Table 1: Research Questions and Studied Contexts

Model	Research Questions	NL (2023)	UK (2025)	US (2025)
Circumplex Model of Affective Reactions (A)	RQ1: Are the feeling thermometers a measure of valence?	E	-	-
	RQ2: Are valence and arousal distinct dimensions of party-related affect, and what is their functional relationship?	E	E	E
	RQ3: How do discrete emotions toward political parties map onto valence and arousal, and how much variance in those emotions do the two dimensions explain?	-	E	-
Circumplex Model of Affective Polarization (B)	RQ4: How are mean arousal and spread of valence related, and does mean arousal vary among individuals with similar levels of spread of valence?	E	E	E
	RQ5: Does mean arousal show incremental validity beyond spread of valence in its associations with a set of political correlates?	E	E	E
	RQ6: Does an arousal-weighted spread metric show stronger associations with a set of political correlates than an unweighted metric?	E	C	C
	RQ7: Do valence/arousal-based polarization metrics yield different associations with political correlates than discrete-emotion-based metrics?	-	E	-

Note. Letters indicate whether a research question was targeted in the different samples; E = exploratory, C = confirmatory.

Methods

We fielded three online surveys in the Netherlands (December 2023), the United Kingdom (May 2025), and the United States (May 2025). Each survey measured (a) valence and arousal toward major political parties and (b) a set of political outcomes tailored to each context (e.g., participation, sophistication,

democratic attitudes, and support for political violence). Below, we describe samples, procedures, and measures for each country.

Pre-registrations for the UK and the US, as well as data and analysis code for reproducing all results, are available at <https://osf.io/29myv>. Deviations from the pre-registrations are discussed in the main text. Reflecting the chronological order of data collection and progression of the project, we discuss the results of the Netherlands first, followed by the UK and the US.

Samples

Data for the Dutch sample were collected by the survey agency Flycatcher as part of a larger omnibus survey⁴. In total, $N = 984$ participants responded to questions assessing the new measures of affective polarization (based on valence and arousal) and the traditional feeling thermometer items. We used quotas to ensure that the sample was representative of the Dutch adult population in terms of age, gender, and education levels (see Appendix A1.1 for more details). To reduce survey length and avoid response fatigue (Galesic and Bosnjak 2009), we used randomized re-routing: all participants completed the affective polarization and political participation items, while only a subset completed items on ideological extremity ($n = 778$), political news consumption ($n = 781$), political sophistication ($n = 781$), and political knowledge ($n = 781$).

The UK sample ($N = 1001$) was collected via Prolific (Prolific 2024). We restricted our sample to participants born and residing in England as we did not include any regional political parties. The sample was balanced in terms of gender and political orientation. The mean age was 44.7 ($SD = 13.6$) and participants varied in their education level (see Appendix A1.2 for more details).

The US sample ($N = 1000$) was collected by YouGov as part of the Partisan Animosity Survey Time Sharing Project (Iyengar, Lelkes, and Westwood 2024) and was representative of the US population in terms of age, gender, race, and education (see Appendix A1.3).⁵

Sample Size Justification. The sample size for the survey fielded in the Netherlands was primarily determined by the available budget. To ensure that our studies were adequately powered, we conducted a post-hoc sensitivity analysis for the Netherlands and two a priori power analyses before data

⁴An overview of the survey is available at <https://osf.io/4f2rb>.

⁵Although we pre-registered to exclude participants without partisan affiliation or leaning, we analyzed the full sample because most results are not contingent on having a political ingroup. All findings are consistent when restricting analyses to partisans ($n_{partisan} = 801$, see Appendix A5.2).

collection in the UK and the US (Lakens 2022; Kurz 2019). Details are provided in Appendix A2. Even in the context of our smallest sample ($N = 781$, the Netherlands), the analyses indicated sufficient statistical power ($\approx .80$) to detect small associations between affective polarization and the studied political correlates ($\beta = .10$; see RQ5/RQ6), and to detect small differences in effect sizes when comparing marginal likelihoods of alternative models of affective polarization based on different metrics ($\Delta\beta = .05$, see RQ6). In both the UK and the US, we recruited 200 additional participants following the same study design. Thus, we were sufficiently powered to detect our effect sizes of interest across all contexts.

Procedure and Measures

Because the Dutch, English, and US surveys were fielded in different omnibus contexts, the political correlates are not fully harmonized across countries. We therefore treat the country analyses as parallel tests of the same theoretical framework, rather than as strict cross-national comparisons. Both valence and arousal were assessed with single items per party. While multi-item scales would offer greater reliability, single-item ratings are common in affective polarization research and allowed us to cover multiple parties within the constraints of an omnibus survey.

The Netherlands. Participants first answered a set of demographic questions, followed by measures of valence (positive vs. negative) and arousal (mild vs. intense) in response to a set of large and ideologically diverse parties (i.e., PVV, GL/PvdA, NSC, VVD, and DENK; for a justification for the reliance on this subset as a valid measure of affective polarization, see Kasper, Schumacher, and Bakker 2025)

Specifically, we instructed participants:

In this section, we are interested in your feelings about several political parties. We ask you to rate:

- Your feelings about the political parties on a scale from 0 to 10, where 0 means you have very negative feelings and 10 means you have very positive feelings.
- The intensity of your feelings (whether positive or negative) when you think about the political parties on a scale from 0 to 10, where 0 means your feelings are very mild and 10 means they are very intense.

If you do not know a party, you can indicate this by using the "*I don't know*" button.

Then, for each party we asked "*How do you feel about [insert party]?*" (0 = *very negative*, 10 = *very positive*) which constituted our valence measure, and "*How intense are your feelings about [insert party]?*" (0 = *very mild*, 10 = *very intense*) which represented our measure of arousal. The wording of the arousal item was adapted from the Human Affectome Project's consensus definition of arousal, which describes it as "[. . .] quality of intensity in affective experience, often described as low to high, marking the extent of excitation, activation, or mobilization [. . .]" (Schiller et al. 2024, , p.13).

Afterwards, we measured a set of political correlates: the mean likelihood of engaging in various forms of political participation (e.g., protesting, signing petitions); ideological extremity (independently of left/right positioning); objective political knowledge (accuracy of responses to a set of political trivia questions); frequency of political news consumption; and subjective political sophistication (i.e., the extent to which individuals feel that they understand, are able to impact, and are interested in politics). Detailed item formulations and operationalizations are available in Appendix A3.1.

At the end of the survey, after three blocks unrelated to the present study, participants responded to traditional feeling thermometer items (see RQ1). Specifically, respondents were asked how much they liked each of the five political parties (i.e., PVV, VVD, GL/PvdA, NSC, DENK) on a scale of 0 (*strong dislike*) to 10 (*strong liking*).

United Kingdom. The procedure and measures in the UK sample closely followed those used in the Netherlands. Specifically, we first measured valence and arousal of affective reactions towards five political parties using the same items as in the Netherlands (i.e., Labour Party, Conservative Party, Reform UK, Liberal Democrats, Green Party), followed by the assessment of the political correlates. The only key differences were as follows: (a) the order of the valence/arousal items was randomized; (b) we did not include the traditional feeling thermometer items; (c) instead of objective political knowledge, we measured democratic attitudes, operationalized as belief in the importance of democracy and disagreement with anti-democratic practices (e.g., restricting the right to protest or opposing universal suffrage); (d) political news consumption was measured using a three-item battery rather than a single item; (e) at the end of the session, participants were randomly assigned to one of four conditions, in which they reported the extent to which they experienced one of four discrete emotions - disappointment, anger, fear, or pride - toward the five assessed political parties, each with two items. The full survey and more

information regarding the operationalizations are available in Appendix 3.2.

United States. The US data were collected as part of a larger omnibus survey (Iyengar, Lelkes, and Westwood 2024). As a measure of valence, participants were instructed: "*We'd like you to rate how you feel towards some groups on a scale of 0 to 100. Zero means very unfavorable and 100 means very favorable. Fifty means you do not feel favorable or unfavorable.*" Participants then rated their feelings towards Democrats/Republicans in randomized order. We assume that this version of the valence measure is conceptually equivalent to the scales used in the Netherlands and the UK (see first part of the Results section).

To assess arousal, participants were later presented with the following instruction: "*Previously, we asked how favorable or unfavorable your feelings towards Republicans or Democrats are. In this section, we are interested in a different aspect. Specifically, we would like to know how mild or intense your feelings are when thinking about each political group, regardless of whether those feelings are positive or negative.*" Participants then indicated (again in randomized order), how intense their feelings were when thinking about Democrats/Republicans (0 = *very mild*, 100 = *very intense*). Both valence and arousal ratings were rescaled by dividing by 10 to match the range of the scales used in the other contexts.

The set of political correlates also differed from both previous contexts as we selected them based on their availability in the omnibus survey. As pre-registered, we examined associations between affective polarization and participants' perceived importance to turn out for elections, their support of politically motivated violence (e.g., vandalism or assault of outparty supporters committed by inparty members), and acceptance of anti-democratic behavior by inparty elites (e.g., punishing companies that support the outparty or ignoring rulings from outparty-affiliated judges). After receiving the data, we also included an additional item assessing whether participants believe it is important to live in a representative democracy - an item we were unaware of at the time of pre-registration (see Appendix A3.3 for item formulations and detailed operationalizations⁶).

⁶We deviated from our pre-registration when operationalizing support for political violence. Because participants were only asked to indicate their support for each new, more severe act of political violence if they supported the previous one, most did not see all items. Therefore, we could not calculate mean support for political violence as planned and instead, assigned each participant a score from 0 to 6 based on the most severe act of political violence they supported (e.g., 0 = endorsed none; 1 = endorsed the first act only; 2 = endorsed the first two acts; etc.). This approach is also used by the researchers administering the America's Political Pulse Survey (Holliday, Lelkes, and Westwood 2025).

Operationalizations of Affective Polarization

All operationalizations of affective reactions and affective polarization used in this study are summarized in Table 2. Building on the two-dimensional Circumplex Model of Affective Polarization (Figure 1, Model B), we use raw valence (v_{ip}) and arousal (a_{ip}) towards the political parties (P) to compute two affective polarization metrics for each individual i : the spread of valence across the set of assessed political parties ($Spread_i$, equations 1-2), and the mean arousal associated with those parties (\bar{a}_i , equation 3). In line with the proposed framework, we treat these as separate dimensions.

Given that some applications may require a more parsimonious, one-variable solution (e.g., to avoid model complexity when affective polarization is an interacting or control variable), we also developed an arousal-weighted spread of valence metric that integrates both dimensions into a single index (Equations 4-5). In the first step (Equation 4), we calculate the arousal-weighted mean valence across the assessed political parties. In the second step (Equation 5), we compute the arousal-weighted spread of valence as the root mean square deviation of each party's valence from the weighted mean, weighting deviations again by the reported arousal for that party. As with the unweighted spread of valence, individuals who express similar feelings towards all parties score low, whereas those who like some parties and dislike others score higher. The key difference is that, using the arousal-weighted spread, existing variation in valence is amplified when accompanied by strong emotional arousal.

In Appendix A5.1, we provide a simulation to illustrate the properties of the formula and empirically demonstrate that, while being very strongly related to other spread measures, the resulting metric more effectively captures mean emotional arousal.

Table 2: Summary of affective reactions and polarization measures.

Affective Reactions	
Valence (v): Direction of feelings (positive vs. negative) towards each political party (collected in: NL, UK, US).	
Arousal (a): Intensity of feelings (mild vs. intense) when thinking about each political party (collected in: NL, UK, US).	
Thermometer (t): Like/Dislike towards each political party (collected in: NL).	
Affective Polarization	
<p><i>Two-variable solution:</i> Unweighted spread of valence (S_{spread_i}, equations 1-2) and mean arousal (\bar{a}_i, equation 3).</p> $\bar{v}_i = \frac{\sum_{p=1}^P (v_{ip})}{n_p} \quad (1)$ $S_{spread_i} = \sqrt{\frac{\sum_{p=1}^P (v_{ip} - \bar{v}_i)^2}{n_p}} \quad (2)$ $\bar{a}_i = \frac{\sum_{p=1}^P (a_{ip})}{n_p} \quad (3)$	<p><i>One-variable solution:</i> Arousal-weighted spread of valence (W_{spread_i}, equations 4-5).</p> $\bar{wv}_i = \frac{\sum_{p=1}^P (a_{ip} * v_{ip})}{\sum_{p=1}^P a_{ip}} \quad (4)$ $W_{spread_i} = \sqrt{\frac{\sum_{p=1}^P a_{ip} (v_{ip} - \bar{wv}_i)^2}{n_p}} \quad (5)$

Note. i = individual, $p(P)$ = political party (parties).

Analysis strategy

All analyses were conducted in R (R Core Team 2025), primarily using the packages `tidyverse` (Wickham et al. 2023), `brms` (Bürkner 2017), and `bayestestR` (Makowski, Ben-Shachar, and Lüdtke 2019). For all Bayesian regression models, we z -standardized all continuous predictors and dependent variables ($M = 0$, $SD = 1$). Thus, regression coefficients (β) represent the expected change in the dependent variables (in standard deviations) for a one standard deviation increase in a continuous predictor, or a shift from 0 to 1 for a dummy-coded categorical predictor. Across all analyses, we used weakly informative priors (Gelman et al. 2008). Given our sample size, these priors exert limited influence on the posterior distributions while still regularizing the scale to reflect that small effects are common in the social sciences (Funder and Ozer 2019; Schäfer and Schwarz 2019). A full list of prior distributions is provided in the pre-registrations for the UK and the US. We summarize posterior distributions by their median and 95% credibility intervals (equal-tailed intervals).

To quantify the strength of evidence for or against the presence of an effect (alternative model vs. null model), we calculated Bayes factors (BFs) using the Savage-Dickey density ratio method (Wagenmakers et al. 2010). BFs are a continuous measure of evidence, with values greater than 1 indicating evidence for the alternative model, whereas values below 1 indicate evidence for the null model. Following general guidelines (Jeffreys 1961; Lee and Wagenmakers 2014), BFs between 1 and

3 (or 1 and $\frac{1}{3}$) are considered anecdotal, between 3 and 10 (or $\frac{1}{3}$ - $\frac{1}{10}$) moderate, between 10 and 100 (or $\frac{1}{10}$ - $\frac{1}{100}$) strong, and above 100 (or below $\frac{1}{100}$) extreme evidence for the alternative (null) model. Although frequentist approaches can offer similar insights, we use Bayesian models because they provide this direct way to quantify uncertainty about both the presence and absence of effects.

All regression models were estimated using four chains with 12,000 iterations (including 2,000 warm-up iterations). Convergence was assessed via trace plots and the Gelman-Rubin diagnostic (all $\hat{R} \leq 1.00$, indicating excellent convergence; Gelman et al. 2013, p. 281 ff.). We also visually inspected predicted posterior distributions against observed data to ensure adequate model fit.

Results

RQ1: Feeling Thermometers Are a Measure of Valence

We tested the assumption that feeling thermometers are a measure of valence by computing the correlation between raw feeling thermometer ratings and raw valence ratings in the Netherlands. We find an almost perfect positive linear relationship between both measures across parties ($r = .90$, 95% *CI* [.89, .90]), and when analyzing the relationship for each party separately (see Appendix 4.1). This indicates that feeling thermometers are essentially measures of emotional valence and that both can be used interchangeably when assessing affective reactions toward political parties.

RQ2: Valence and Arousal Are Distinct Dimensions of Affect Towards Political Parties

Next, we examined the relationship between valence and arousal ratings (and, by extension, between feeling thermometers and arousal) to assess whether arousal captures a distinct dimension of individuals' affective reactions to political parties (see Model A, Figure 1). Figure 2 visualizes the associations between arousal and valence across political parties in each country. We provide formal statistical tests in Appendix A4.2.

Across contexts, the relationship between the two dimensions is nonlinear. Positive feelings toward parties ($valence > 5$) are accompanied by higher arousal across all countries and political parties. Negative feelings ($valence < 5$), however, show more heterogeneous associations with arousal, ranging from positive to absent depending on the country and the party being evaluated. This heterogeneity appears to reflect mainly two distinct response patterns: some participants report strong negative

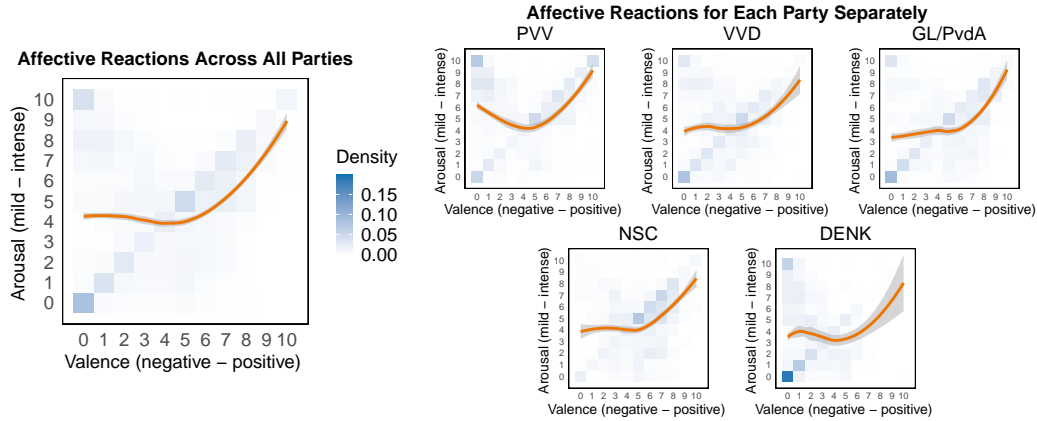
evaluations of political parties accompanied by high emotional arousal, while others express similarly negative evaluations with very low arousal. When the former group dominates, negative valence is positively associated with arousal. When the two groups are similarly represented, or when the latter group is more prevalent (i.e., more people who harbor strong dislike accompanied by low emotional arousal), the association is absent or even negative.

Examining associations at the party level (see party-specific panels in Figure 2), we find that the positive association between negative valence and arousal is strongest for populist radical-right parties in Europe (i.e., PVV, Reform UK) and the Republican Party in the United States, potentially due to their high salience and central role in partisan conflicts. For other parties (e.g., Liberal Democrats, GL/PvdA), the association is weaker or absent. These patterns suggest that the emotional intensity associated with negative party evaluations is shaped not only by personal dislike but, consistent with our theoretical model, also by a party's political relevance and position within the broader national context.

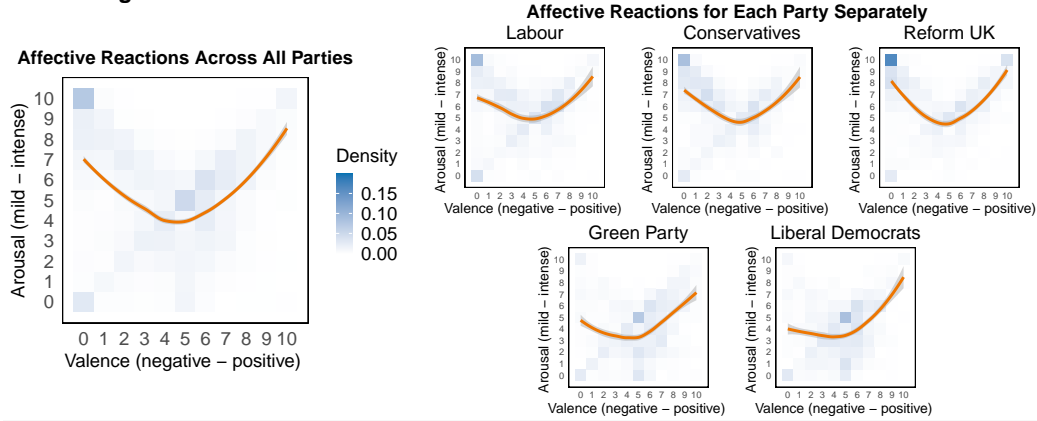
Taken together, these findings answer RQ2: valence and arousal are related but distinct dimensions of affect toward political parties. Arousal does not simply mirror valence or its intensity. Strong negative evaluations may be accompanied by either high or low arousal, depending on the context and the party being judged. This pattern suggests that individuals can dislike political outgroups in qualitatively different ways — either with heightened emotional activation or in a colder, less affectively intense manner. Our conclusions align with previous research in psychology on the relationship between valence and arousal (Kuppens et al. 2013; Russell 2003).

Figure 2: Relationship between Valence and Arousal Ratings

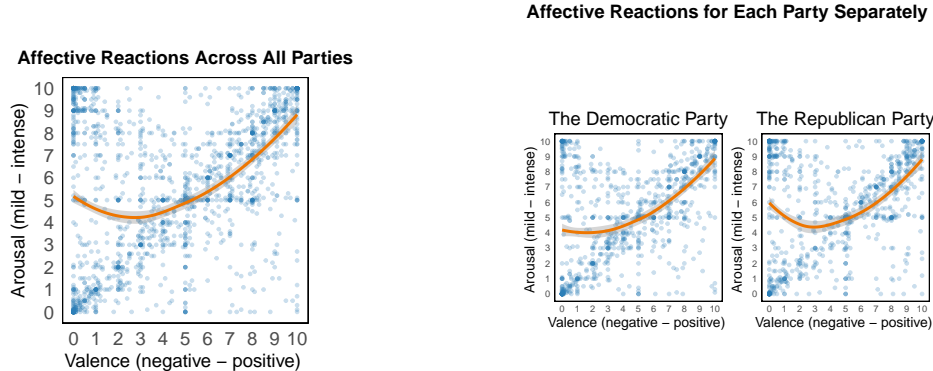
The Netherlands



United Kingdom



United States



Note. Relationship between valence (x-axis, *negative - positive*) and arousal (y-axis, *mild - intense*) ratings in the Netherlands, the UK, and the US across all political parties (left panel) and separately for each political party (right panels). For the Netherlands and the UK, each of the quadrants in the panels represents a unique combination of valence and arousal ratings. The portion of participants in each quadrant is illustrated by the blue shading, with darker shading indicating a higher portion of participants. For the US, each point in the panels represents one participant given that valence and arousal were measured on continuous scales. In all panels, the orange line depicts the relationship between valence and arousal ratings (estimated via locally weighted scatterplot smoothing) along with the standard error (gray shading).

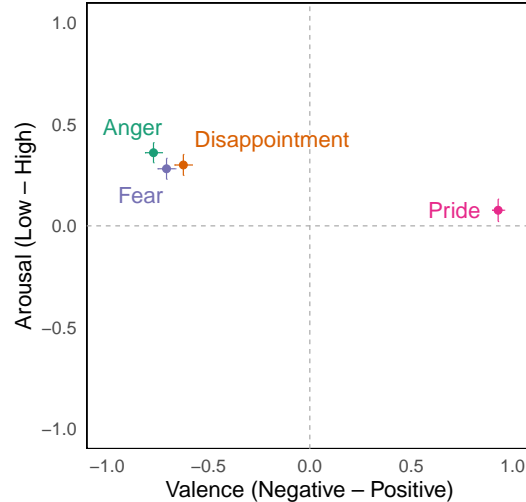
RQ3: Valence and Arousal Capture Substantial Variation in Discrete Emotions

To answer RQ3, we turn to the UK data and explore how our two-dimensional approach to affective reactions compares to the discrete emotions approach. First, we assessed how well valence and arousal account for the discrete emotions by regressing each emotion on valence, arousal, and their interaction, and examining the explained variance. The two-dimensional framework explains substantial variance in each emotion (R^2 , see Appendix A4.3 for model specifications and detailed outputs): 49.76% for disappointment (95% CI [46.13%, 53.03%]), 62.41% for fear (95% CI [59.76%, 64.80%]), 72.81% for anger (95% CI [70.99%, 74.43%]), and 83.88% for pride (95% CI [82.91%, 84.74%]). In fact, valence alone accounts for much of the variance in the discrete emotions, with arousal and their interaction contributing an additional 2.34%–7.06% of explained variance (see Appendix A4.3).

Second, we mapped each discrete emotion onto the valence-arousal space using four multivariate Bayesian models, jointly estimating valence and arousal as functions of each of the four emotions while controlling for their covariance (see Figure 3, detailed model outputs and model specifications are provided in appendix A4.3). We find, in line with research in psychology (Kuppens et al. 2013; Fontaine et al. 2022), that anger and fear are both characterized by negative valence and high emotional arousal, while pride is associated with positive valence and moderate arousal (see Figure 3). Disappointment, often considered a low-arousal emotion (Fontaine et al. 2022), is positioned similarly to anger and fear in terms of valence *and* arousal.

Overall, the fact that the valence-arousal framework captures much of what is reflected in participants' discrete emotion ratings, and that different negative emotions cluster closely together in terms of their valence and arousal profiles, suggests that discrete emotions may offer relatively limited additional insight beyond the two-dimensional model (see also RQ7, for an empirical demonstration).

Figure 3: Discrete Emotions in the Valence-Arousal Space



Note. The plotted coordinates represent standardized regression estimates and 95% credibility intervals derived from four separate multivariate Bayesian models jointly predicting valence (x-axis) and arousal (y-axis). Given that all variables were z-standardized, values on x-/y-axes reflect the predicted change in valence/arousal (in standard deviations) associated with a one-standard-deviation increase in the respective discrete emotion.

RQ4: People Vary in Mean Arousal Despite Similar Levels of Spread of Valence

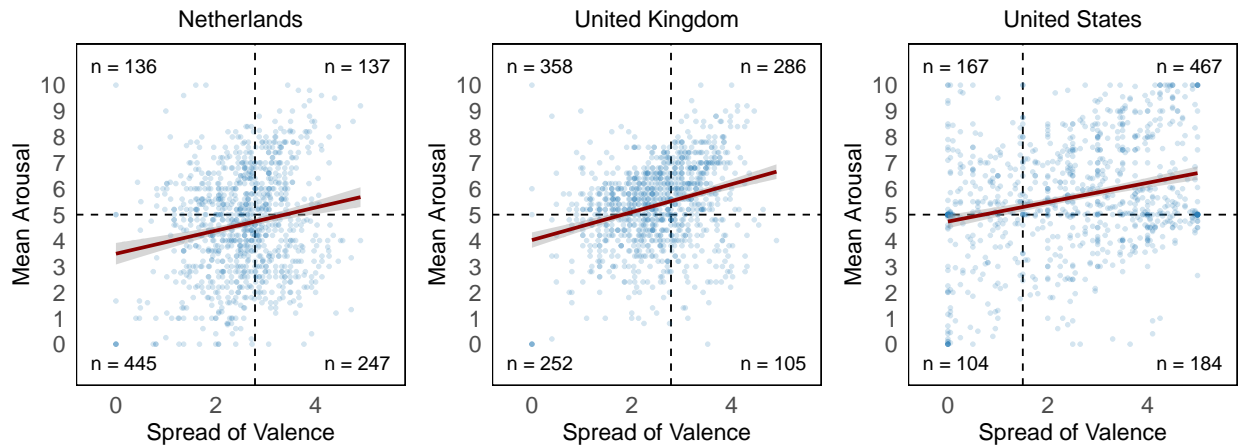
For mean arousal to add value beyond the spread of valence as a measure of affective polarization, it must vary at least partly independently of the spread of valence. Figure 4 plots the relationship between both dimensions. Across all countries, we find only weak positive correlations between spread of valence and mean arousal (NL: $r = .18$, 95%CI[0.12, 0.24], $BF > 1000$; UK: $r = .29$, 95%CI[0.23, 0.34], $BF > 1000$; US: $r = .26$, 95%CI[0.20, 0.32], $BF > 1000$). People who are more polarized in valence tend, on average, to feel somewhat more aroused, but the association is far from deterministic.

To illustrate this heterogeneity, we classify respondents into “polarized” vs. “non-polarized” and “hot” vs. “cold” using the theoretical midpoint of the spread-of-valence scale (i.e., the median of all possible values for five/two parties) and the midpoint of the arousal scale. Substantial proportions of respondents fall into each of the four quadrants, including “cold but polarized” and “hot but non-polarized” profiles. This shows that overall, emotional arousal toward parties can vary independently of how strongly respondents differentiate between in- and out-parties, underscoring the value of treating mean arousal as a distinct dimension of affective polarization.

Note that, while we draw on the four quadrants to illustrate how individuals who differ in their affective

polarization profiles can be described within our theoretical framework, we always treat both spread of valence and mean arousal as continuous measures. This approach is more consistent with our theoretical model (see Figure 1) and avoids the loss of information and statistical power that would result from grouping individuals who may vary considerably on either dimension.

Figure 4: Relationship Between Spread of Valence And Mean Arousal



Note. Mean arousal (y-axis) and spread of valence (x-axis) are unstandardized. The red line shows the fitted linear relationship, with gray shading representing the standard error. The horizontal black dotted line marks the midpoint of the arousal scale. The vertical black dotted line marks the theoretical midpoint of the spread of valence metric, computed as the median of all values the metric can take when calculated across five parties (Netherlands/UK) or two parties (US). Numbers within each quadrant indicate the number of respondents located there.

RQ5: Mean Arousal Exhibits Distinct Associations Beyond Spread of Valence

To assess the added value of mean arousal beyond spread of valence, we examined how different polarization metrics relate to a set of key political correlates. We begin with models including spread of valence and mean arousal as separate predictors, as this specification most directly reflects the theoretical framework outlined in Figure 1 (Model B). We use a set of Bayesian linear models with the political correlates as criteria and spread of valence and mean arousal as the primary predictors, controlling for age, gender, and education (in the US, we also controlled for race). Figure 5 summarizes the results by displaying the medians and 95% credibility intervals of the posterior distributions for the coefficients of spread of valence (black) and mean arousal (red), along with the corresponding Bayes factors (*BF*; see Appendices A4.5.2-A4.5.4 for the model specification and detailed outputs). Note that, in this section, we focus exclusively on the additive specification (black/red estimates); the single-

variable metrics (blue/yellow estimates) are discussed in the next section.

In the Netherlands, political participation is positively related to mean arousal, but not to spread of valence. Both dimensions are positively associated with ideological extremity and political news consumption. For political sophistication, we find strong evidence for a positive association with mean arousal and no conclusive evidence for or against an association with spread of valence. Finally, we find strong evidence for the absence of a relationship between spread of valence and objective political knowledge and anecdotal evidence for the absence of such a relationship with mean arousal.

The results in the UK mirror those from the Netherlands, with mean arousal exhibiting distinct associations with political correlates beyond those captured by spread of valence. Specifically, both spread of valence and mean arousal were positively related to political participation, ideological extremity, and political news consumption. For political participation and news consumption, associations with mean arousal were stronger than those with spread of valence, whereas the opposite was true for ideological extremity. There was a positive association between political sophistication and mean arousal, but evidence for the absence of an association with spread of valence. Mean arousal was also positively related to democratic attitudes, while the evidence for an association between democratic attitudes and spread of valence was inconclusive.

When examined as separate dimensions of affective polarization in the US, spread of valence and mean arousal were both positively related to the belief that voting is important and to the belief that living in a representative democracy is important⁷. For the former, the association with spread of valence was more pronounced than the association with mean arousal, while the strength of associations was very similar for the latter. We found evidence for the absence of an association between support for political violence and either dimension of affective polarization. Finally, spread of valence, but not mean arousal, was positively associated with the endorsement of anti-democratic elite behavior.

To summarize, while most associations with both dimensions of affective polarization are directionally consistent, political correlates often exhibit associations with mean arousal that are as strong as — or even stronger than — those with spread of valence. In line with theories suggesting that

⁷For outcomes measured on ordinal scales (i.e., importance of democracy, importance of voting, and support for political violence), we used cumulative probit models rather than linear Gaussian models. As preregistered, we conducted posterior predictive checks and found that the Gaussian model could not accurately capture the observed distributions, due to the ordinal response format and strong skewness, which may bias the estimates (see Appendix A4.5.1 for details). The interpretation of the reported coefficients differs somewhat from those in the linear models: a one standard deviation increase in a predictor reflects a β -standard deviation change in the underlying latent variable z , rather than the observed outcome.

arousal serves an activating function by signaling urgency and importance (Storbeck and Clore 2008), mean arousal is particularly strongly related to indicators of political engagement such as participation, news consumption, and subjective sophistication, but also a general commitment to democratic values. Spread of valence is more strongly related to ideological extremity which is consistent with evidence that feeling thermometers partly capture ideological orientations (Shikano and Nyhuis 2019; Rogowski and Sutherland 2016; Orr and Huber 2020). Including mean arousal alongside spread of valence may allow us to increase explanatory power and, importantly, uncover relationships that would remain undetected relying only on valence (e.g., political participation/sophistication in the Netherlands, political sophistication/democratic attitudes in the UK).

Given our interest in identifying broad patterns across many associations, we decided to report additive linear Bayesian models in the main text. An in-depth exploration using multiplicative generalized additive models is presented in Appendices A4.5.5-A4.5.7 (Simonsohn 2024; Janssen and Turkenburg 2025). Importantly, our conclusions regarding the distinct role of mean arousal substantively align, suggesting that they are not merely a result of the model specification presented here.

RQ6: Arousal-Weighted Spread Shows Stronger Associations with Political Correlates

To evaluate whether incorporating arousal in a single-variable metric of affective polarization strengthens its associations with political correlates, we compared associations between the correlates and arousal-weighted spread of valence or the unweighted spread of valence (see Table 2 for the corresponding operationalizations). For each political correlate, we estimated Bayesian linear models with either the unweighted or arousal-weighted spread as the primary predictor, controlling for age, gender, and education (and race in the US). We also compared marginal likelihoods for specifications using the unweighted versus arousal-weighted spread as main predictor. We summarize the results visually in Figure 5 and provide full model outputs in Appendices A4.6.2-A4.6.4. Results from generalized additive models are reported in Appendices A4.6.5-A4.6.7. In the main text, we focus on describing the overall trends within each country.

In the Netherlands, we find a positive association between political participation and the arousal-weighted spread of valence, whereas the association with the unweighted spread is comparatively modest and only weakly supported by the corresponding Bayes factor. Both metrics are positively related to ideological extremity, political sophistication, and political news consumption. In each case, the as-

sociations are somewhat stronger for the arousal-weighted measure. For objective political knowledge, we find evidence against an association with either metric. Overall, incorporating arousal strengthens the associations of affective polarization with political correlates, particularly for those with strong links with mean arousal (see previous section).

We replicate this finding in the UK. The unweighted and arousal-weighted spread of valence are positively related to political participation, political news consumption, political sophistication, and democratic attitudes⁸, but the associations are consistently stronger for the arousal-weighted metric. Both metrics are similarly positively related to ideological extremity.

In the US, both the arousal-weighted and unweighted spread of valence were positively associated with the abstract belief in the importance of democracy and with the perceived importance of turning out for elections. In both cases, the association was somewhat stronger for the arousal-weighted metric. We found no substantial relationship between either metric and support for political violence. Only the unweighted metric was positively associated with the endorsement of anti-democratic elite behavior.⁹

It is worth noting that, across all countries and most correlates, the unweighted spread of valence exhibits somewhat stronger associations in the single-predictor models than in the additive models controlling for mean arousal that were discussed in the previous section (see black and blue estimates in Figure 5). This implies that, when mean arousal is omitted from the specification, the coefficient for the unweighted spread of valence partly reflects shared variance with mean arousal rather than a purely valence-based association. However, even when not controlling for arousal, the associations are mostly weaker than those of the arousal-weighted spread. This suggests that, although the unweighted spread indirectly reflects arousal to some extent, it captures it less effectively than the weighted metric (see also Appendix A5.1).

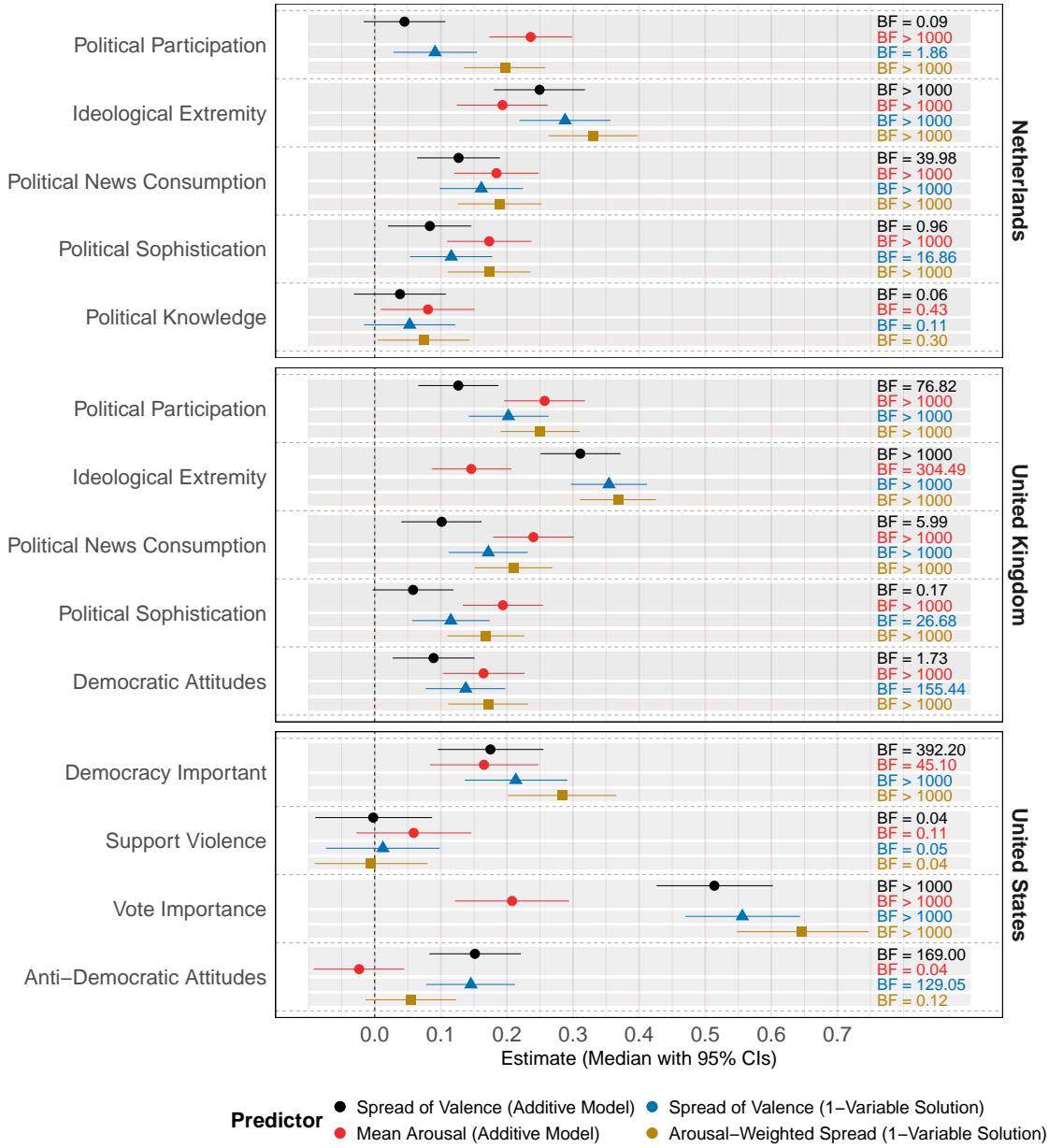
To summarize, the arousal-weighted spread metric tends to exhibit stronger associations with politi-

⁸While we expected a negative relationship between affective polarization and democratic attitudes based previous findings (see, e.g., Orhan 2022; Gessler and Wunsch 2025), effects have been small and inconsistent, with little causal evidence available (Broockman, Kalla, and Westwood 2023). Two potential confounds may account for the positive association: affective polarization may be fueled by higher levels of political engagement and by opposition to the populist radical-right (Harteveld, Mendoza, and Rooduijn 2022; Harteveld and Wagner 2023); both factors are likely to be positively associated with democratic attitudes (Martin and Van Deth 2007; Mont'Alverne, Moraes, and Kemer 2022; Quintelier and Van Deth 2014). Supporting the latter, we find that the positive association is present among supporters of all parties except the right-wing populist Reform UK (see Appendix A4.6.8).

⁹As illustrated in Appendix A4.6.9, this divergence partly reflects differences by party affiliation: among Democrats, affective polarization is negatively associated with support for anti-democratic elite behavior when measured with the arousal-weighted metric, a pattern not observed with the unweighted metric. Among Republicans, affective polarization is positively related to the endorsement of anti-democratic elite behavior for both metrics.

cal correlates across all contexts and is consistently favored by direct model comparisons. While the differences in effect sizes vary by correlate and country and absolute differences are modest ($\Delta_{\beta} \approx .05$), even small gains in explanatory power may be meaningful given the typically small effect sizes observed in affective polarization research (Wagner 2021, 2024). Differences between both metrics are most pronounced for correlates that signal political engagement (e.g., participation, news consumption), which, as shown in the previous section, are more strongly associated with mean arousal. The results are in line with our conceptual argument that incorporating emotional arousal captures an important component of politicized intergroup evaluations beyond valence alone. However, unlike the full two-dimensional solution, the one-dimensional arousal-weighted index does not fully capture emotional arousal, nor does it reveal which component of affective polarization — spread of valence or mean arousal — drives a given association. We return to the advantages and trade-offs of both approaches in the discussion section.

Figure 5: Associations between Valence-/Arousal-Based Polarization Metrics and Political Correlates



Note. The red and black estimates illustrate the associations between both dimensions of the Circumplex Model of Affective Polarization (spread of valence and mean arousal) and political correlates from additive regression models in Netherlands, the UK and the US. The blue and yellow estimates show associations between the unweighted (blue) and arousal-weighted (yellow) spread of valence as two alternative single-variable operationalizations of affective polarization assessed in separate regressions. Each point represents the median of the posterior distribution for a standardized regression estimate. Horizontal error bars indicate 95% credibility intervals. *BF*s corresponding to each coefficient are displayed on the right. In each model, we control for age, gender, and education level (and in the US for race). Higher values indicate stronger associations between affective polarization and the respective correlate. In the US, for the belief in the importance of voting and democracy, and support for political violence, estimates are from cumulative probit models.

RQ7: Valence/Arousal- and Discrete-Emotion-Based Metrics Have Similar Correlates

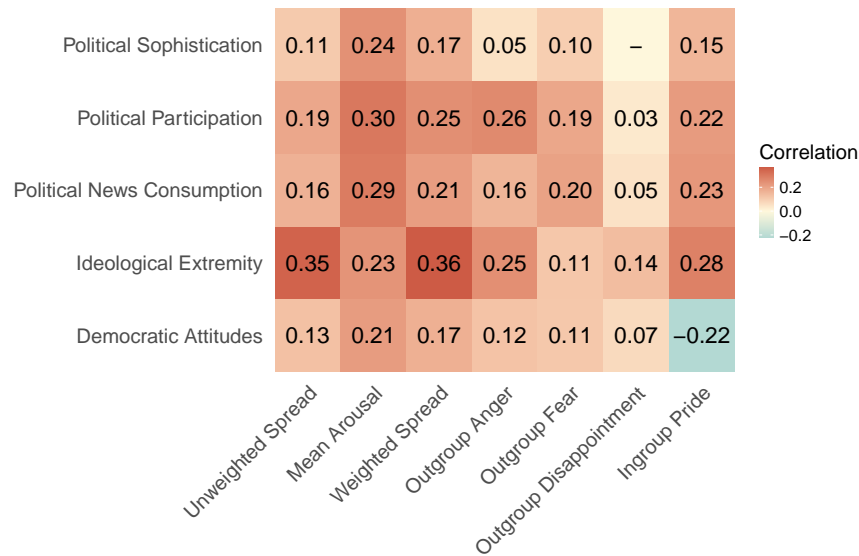
RQ7 evaluates whether the empirical implications of affective polarization depend on how it is conceptualized: through valence and arousal, or through discrete emotions toward political (out-)groups. To address this, we use the UK data to compare how different affective polarization metrics relate to the same set of political correlates.

We correlated metrics derived from the Circumplex Model of Affective Polarization (i.e., mean arousal, unweighted/arousal-weighted spread of valence) with political participation, news consumption, ideological extremity, political sophistication, and democratic attitudes. We then compare these associations to those obtained from discrete-emotion measures, based on outgroup anger, fear, disappointment, and ingroup pride¹⁰, to examine whether the sign and magnitude of associations depend on how affective polarization is conceptualized. This analysis is based on the data collected in the UK. Figure 6 displays the bivariate correlations (see Appendix A4.7 for details).

Across almost all political correlates, all affective polarization metrics show directionally consistent associations. In other words, affective polarization — whether operationalized through the Circumplex Model or discrete emotions — is linked to greater political engagement (e.g., participation, news consumption), more ideological extremity, and pro-democratic attitudes. Among the metrics, those derived from the Circumplex Model, and especially those based on arousal, tend to show the strongest associations across outcomes, underscoring the added value of incorporating arousal. A notable exception is ingroup pride, which shows a negative association with democratic attitudes, diverging from other metrics. Overall, discrete emotion-based measures of affective polarization seem to offer little additional insight over valence- and arousal-based metrics in their associations with political correlates.

¹⁰Note that, while it would be possible to calculate similar aggregate metrics for discrete emotions, we focus on outgroup emotions as the most common way to operationalize affective polarization when relying on discrete emotions (Berntzen, Kelsall, and Harteveld 2022; Kretchner et al. 2024; Scheve 2024; Lawall, Versteegen, and Tsakiris 2025). The outgroup was defined as the party toward which a participant reported the lowest valence rating and the ingroup as the party with the highest valence rating. In cases where two or more parties tied on valence, we selected the party with the higher arousal rating and if a tie still remained, one of the tied parties was selected at random.

Figure 6: Valence/Arousal- and Discrete-Emotion-Based Polarization Metrics And Their Correlates



Note. Pearson Correlation between the different affective polarization metrics and political correlates. The correlation between political sophistication and outgroup disappointment is not displayed because, while not exactly $r = 0$, it was smaller than ($r = 0.005$) and larger than ($r = -0.005$).

Conclusion

Our study shows that neglecting arousal — one of the two key dimensions of affect — means that existing work on affective polarization does not fully capture its affective component and can obscure or misstate its links to political outcomes (Bakker and Lelkes 2024; Scherer 2024). We proposed a framework grounded in the Circumplex Model of Affect and demonstrated that feeling thermometers primarily measure valence; that valence and arousal form empirically distinct dimensions; and that both are needed to characterize people’s affective reactions toward political parties. Spread of valence and mean arousal are only weakly correlated, implying that individuals who seem to be equally “affectively polarized” on traditional, valence-based metrics can differ sharply in how emotionally aroused they are. Moreover, mean arousal is consistently, and often more strongly, related to political correlates than spread of valence. Table 3 summarizes these findings and the advantages of the extended framework.

Our results point to arousal as an activating dimension of affect that signals urgency and importance in political contexts (Storbeck and Clore 2008; Wundt 1924). Its role is particularly pronounced in domains of political engagement (e.g., participation, news consumption) that have been theoretically linked to affective polarization (Wagner 2024; Hartevelde and Wagner 2023). In those domains, mean

arousal partly exhibits associations even in the absence of relationships with spread of valence. At the same time, mean arousal is also related to a broad set of other variables studied in affective polarization research such as ideological extremity and commitment to democratic values (Wagner 2024; Iyengar et al. 2019). Although our analyses focus on aggregate measures of affective polarization, the framework is equally valuable for researchers who wish to study positive reactions toward political ingroups and negative reactions toward outgroups separately, since valence and arousal jointly capture these reactions (see RQ2).

Integrating arousal and valence into a single arousal-weighted polarization metric, we find somewhat stronger associations with political correlates than when relying on an unweighted measure. However, as emphasized above, the arousal-weighted metric should be seen as a pragmatic compromise: it incorporates arousal better than the traditional approach but does so imperfectly and does not highlight which dimension (i.e., spread of valence or mean arousal) drives the association to political correlates. Therefore, we recommend its use mainly when parsimony is required (see Table 3).

In evaluating the discrete-emotions approach as an alternative extension of the conceptualization of affective polarization (Scherer 2024; Halperin et al. 2024), we show that the valence-arousal framework accounts for a substantial share of the variance in discrete emotions and that self-reports of different negative emotions map highly similarly onto the two dimensions. One likely explanation is that respondents struggle to reliably distinguish among discrete (negative) emotions toward political parties (Rhodes-Purdy, Navarre, and Utych 2021; Rebasso, Schumacher, and Rooduijn 2025). Instead, self-reports in political contexts may reflect more diffuse affective states of positive or negative valence that individuals retrospectively label as specific emotions when prompted (Rebasso, Schumacher, and Rooduijn 2025; Barrett 2017). We also find that different operationalizations of affective polarization, whether based on discrete emotions or on the Circumplex Model of Affect, produce consistent associations with political correlates, with metrics based on valence and arousal typically yielding the strongest relationships. This implies that, while studying specific discrete emotions remains valuable when they are theoretically important, the valence-arousal approach has clear advantages when the goal is to assess affective polarization more broadly: it is more parsimonious, captures much of what discrete emotions provide, and aligns closely with the conceptualization of affective polarization as variation across distinct poles.

We see several promising avenues for future research to address the limitations of this initial intro-

duction of the two-dimensional framework. A first extension concerns the generalizability of our findings beyond vertical affective polarization (i.e., feelings toward political parties and elites). We expect similar dynamics to characterize horizontal polarization (i.e., feelings toward party supporters). Our US measures, which referred to “Democrats” and “Republicans” as groups, lie between vertical and horizontal conceptualizations, and in an additional Dutch sample ($N = 968$) we replicated our results using parallel measures directed at party voters reaching substantially the same conclusions (Appendix A5.3). Nevertheless, further work is needed to examine whether these patterns extend to other political contexts and measurement approaches, particularly where vertical and horizontal dynamics are expected to diverge.

A second direction for future research concerns experimental designs. Much existing work on affective polarization, including our own, relies on cross-sectional data (Wagner 2024). Our framework lends itself particularly well to experimental tests, as emotional arousal may be easier to causally manipulate than relatively stable valence-based attitudes toward political parties. A broader range of affect measures could also be incorporated into such designs (Bakker, Schumacher, and Rooduijn 2021; Arceneaux, Bakker, and Schumacher 2024; Bakker and Schumacher 2025).

A third direction is to more systematically examine how negative reactions toward political groups vary in their level of emotional arousal (e.g., depending on party type or position within the political system), to what extent spread of valence and mean arousal vary across time and contexts, and whether different groups of individuals exhibit distinct profiles across the two dimensions of affective polarization. We also encourage future replications in other countries and with a broader set of political correlates.

To conclude, by integrating arousal, we extend the conceptual foundations of affective polarization following leading theories of affect. In doing so, we also improve the predictive validity of operationalizations of the concept. In line with recent calls (Bakker and Lelkes 2024), we show the value of putting affect into theories and operationalizations of affective polarization.

Table 3: Summary of the Findings

Research Questions and Key Findings			
Question	Key Finding		
RQ1	Feeling thermometers are a measure of emotional valence.		
RQ2	Valence and arousal are distinct dimensions that are both necessary to comprehensively describe affect toward political parties.		
RQ3	Valence and arousal capture substantial variation in discrete emotions (e.g., anger, fear, disappointment, pride). Negative discrete emotions do not differ substantially in terms of their associated valence and arousal.		
RQ4	People vary in their mean level of emotional arousal despite similar levels of spread of valence.		
RQ5	Mean arousal exhibits distinct associations with political correlates, often as strong as or even stronger than those with spread of valence.		
RQ6	The arousal-weighted spread of valence shows stronger associations with political correlates than the unweighted spread of valence.		
RQ7	Valence/arousal- and discrete-emotion-based metrics show largely directionally consistent associations with political correlates, while associations with the valence/arousal-based metrics tend to be stronger.		
Comparison: One- vs. Two-Variable Solution			
<i>Operationalization</i>	<i>Advantages</i>	<i>Disadvantages</i>	<i>Application</i>
Two-variable solution: Unweighted spread of valence and mean arousal as two independent variables.	<p>Most accurate representation of the theoretical model (Circumplex Model of Affective Polarization)</p> <p>Explains the most variance in relationships with political correlates (largest prediction gain relative to unweighted spread of valence)</p> <p>Provides insight into which dimension drives observed effects</p>	Higher model complexity, particularly in analyses involving interactions with other variables	<p>Best suited when affective polarization is the main predictor (no interactions)</p> <p>Also appropriate when examining how other variables influence the separate dimensions of affective polarization</p>
One-variable solution: Arousal-weighted spread of valence as single independent variable.	<p>Single-variable operationalization (simpler model specification, easier inclusion in interaction terms)</p> <p>Explains consistently more variance in relationships with political correlates than the unweighted spread of valence</p>	<p>Only partially captures the theoretical model (does not fully represent mean arousal)</p> <p>Explains somewhat less variance than the two-variable solution in associations with political correlates</p> <p>Conflates effects primarily driven by valence or arousal</p>	Recommended when parsimony is required (e.g., when affective polarization interacts with other variables or is included as a control)

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Ethics standards

The study conducted in the Netherlands was approved by the Ethics Committee of the Amsterdam Institute for Social Science Research (FMG-6419). The studies conducted in the UK (FMG-10719_2024) and the US (FMG-11238_2024) were approved by the Ethics Committee of the Amsterdam School of Communication Research. All participants were appropriately compensated in line with national standards.

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Conflict of interests

The authors declare no conflicts of interest in this research.

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