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Every vote you make: Attachment and state culture predict bipartisanship in U.S. Congress

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ABSTRACT

Do politicians' relational traits predict their bipartisan voting behavior? In this paper, we empirically test and find that relational individual dispositions, namely attachment orientations and conformity to cultural norms, can predict the bipartisan voting behavior of politicians in the United States House of Representatives and Senate. We annotated politicians' tweets using a machine learning approach paired with archival resources to obtain politicians' home-state looseness-tightness culture scores. Anxiously-attached politicians were less likely to be bipartisan than avoidantly-attached individuals. Bipartisan voting behavior was less likely in politicians whose home state was less tolerant of deviation from cultural norms. We discuss these results and possible implications, such as the preemptive assessment of politicians' bipartisanship likelihood based on attachment and state cultural pressure to adhere to group norms.

1. Introduction

Politics worldwide are becoming polarized (Carothers & O'Donohue, 2019). Democracy in the United States of America is no exception. Over the last thirty years, there has been an ever-growing fissure between the two major US political parties. These parties have been increasingly enacting an "us" versus "them" mentality, which, not surprisingly, drives loyalty and bias toward one's party (Hanges et al., 2019). Politics in the USA is now framed using the terminology of war. Despite being essential to the formation of the country in the first place, compromise and cooperation have become associated with weakness, surrender, and defeat by some political factions (Coppins, 2018). This attitude has taken hold in the US Congress despite 75 % of Americans stating they want Congressional members to compromise (Montanaro, 2022).

In the present study, we tested whether politicians' relational traits (i.e., attachment orientations) and state-level cultural tightness affect political bipartisanship. Previous research has documented the role of personality traits in political behavior (Ramey et al., 2016) but the role of relational traits has not yet been explored with regard to political behavior and especially not in the particular context of bipartisanship. More specifically, we use a machine learning approach to infer attachment traits of politicians using publicly available Twitter data. Doing so allowed us to extend previously ignored personality factors to a critical population.

2. Attachment orientations

Attachment is "a key framework for interpersonal functioning, adult attachment orientations, and the corresponding mental representations of self and significant others (internal working models) [developed as a result of] … early socialization experiences" (Gruda & Kafetsios, 2020). These cognitive representations are believed to be shaped by figures from early life such as parents but are also affected by important relationships, partners, or even more abstract representations learned later in life (Fraley et al., 2015), and underly whether a person is more anxious or avoidant toward new partners.

Attachment orientations differ along two dimensions – "anxiety" and "avoidance". Avoidant attachment orientation results from early

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socialization experiences with unresponsive caregivers (Gruda & Kafetsios, 2020). Repeated experiences with callous caregivers result in negative expectations about receiving emotional support and affirmations from others. As a result, avoidant individuals view others negatively, develop a preference for emotional distance, center their goals around self-reliance and personal interests, and suppress emotional memories and thoughts that might harm their view of themselves (Mikulincer & Shaver, 2007; Rom & Mikulincer, 2003).

Anxiously-attached individuals generally hold more positive views of others and a negative view of themselves, which guides them to excessively seek reassurance to avoid separation and abandonment (Spielmann et al., 2013). They focus on and prioritize affirmations and acceptance by others (Mikulincer & Shaver, 2015). Consequently, anxiously-attached individuals have a strong need for emotional closeness and reliance on others (e.g., Mikulincer & Shaver, 2007).

In short, attachment orientations guide behavior and reactions to the behavior of others during interactions. And since attachment explains individuals' search for affectional bonds with others, attachment orientations are most relevant in explaining relational outcomes (Gruda & Kafetsios, 2022).

2.1. Attachment orientations, group conformity and bipartisanship

Political environments are accompanied by challenges such as conflicts and stress, especially between members of different parties. Bipartisanship, therefore, requires the politician to be sufficiently secure to risk reaching across party lines to identify and establish networks of like-minded individuals. And while most of the research has closely examined the Big Five personality traits, relational traits such as attachment traits constitute more relevant and accurate predictors of relationship outcomes (Noftle & Shaver, 2006). Hence, we argue that attachment orientations may predict relational political party outcomes, namely (bi)partisan voting behavior.

2.1.1. Anxious attachment

Due to their negative perceptions of self, anxiously-attached individuals tend to frequently worry about group acceptance due to their hyperactivated attachment system (Ein-Dor & Hirschberger, 2016). Such individuals also prefer high group cohesion, which helps reduce their abandonment fears and anxieties (Rom & Mikulincer, 2003). Anxiously-attached individuals also believe they have little control over relational outcomes, which fuels their abandonment fears (Smith et al., 1999). In other words, such individuals are preoccupied with being socially accepted and overly concerned with proximity to others (Mikulincer & Shaver, 2015). Therefore, their decision-making likely is vulnerable to the influence of group norms and their desire to seek reassurance and acceptance from their group members. Thus, we hypothesize the following:

H1. Anxious attachment in politicians is negatively associated with bipartisanship.

2.1.2. Avoidant attachment

On the other hand, avoidantly-attached individuals have difficulty trusting others, which in turn results in seeking emotional distance and independence. Even in cases of high group cohesion, avoidant people's negative cognitions remain (Smith et al., 1999). This stems from the distress caused by interdependent groups, threatening an avoidant person's self-reliance and autonomy causing them to neglect members (Rom & Mikulincer, 2003). In situations where group interactions cannot be avoided, the avoidant politician may create conflict with other party members to emotionally distance themselves from others.

These findings imply that avoidantly-attached individuals are more concerned with emotional distancing and self-reliance, based on their negative perceptions of others in general and their disliking of interdependence (Mikulincer & Shaver, 2015). Drawing on these suggestions, avoidantly-attached politicians' indifference to their party members may allow them to form independent opinions and decisions, and act transactionally with politicians from a different party provided that bipartisanship fulfills their personal interest. We hypothesize the following.

H2. Avoidant attachment in politicians is positively associated with bipartisanship.

3. Looseness-tightness cultural influences

Values and norms held by people in the United States vary from state to state (Harrington & Gelfand, 2014) largely due to cultural tightness-looseness. States with tighter cultures exhibit greater norm adherence and lower tolerance for deviation. These authors report that culturally-tighter states tend to have higher incarceration rates, lower levels of civil liberties, less illicit drug use per capita, and fewer reported incidents of binge drinking than culturally-looser states. Culturally-looser, as opposed to culturally-tighter, states have more social instability and homelessness. This cultural backdrop provides a context for understanding bipartisanship and how politicians navigate their roles with their constituents.

We argue that state-level tightness-looseness moderates the relationship between attachment styles and bipartisanship, which aligns with the observed increased societal polarization. In culturally-tighter states, politicians might face more significant challenges in reaching across the aisle, as bipartisanship could lead to exclusion or marginalization within their party. Hence, avoidantly-attached politicians might find it more challenging to do so in tighter states where deviation from norms is less tolerated. On the other hand, the need to be accepted by the ingroup might be intensified for anxiously-attached individuals who are from tighter states. This amplification could lead to a stronger adherence to party lines and a reduced likelihood of bipartisan collaboration. Conversely, in looser states, there might be more acceptance of bipartisan efforts, especially by avoidant-attached politicians who are less concerned with how their social group views and therefore more likely to also vote for bills proposed by the opposite political party. After all, bipartisanship, by definition, requires compromise and is only possible when politicians have the flexibility to deviate from state-level norms and their constituents' values, expectations, and beliefs. We hypothesize the following:

H3. State-level cultural tightness is negatively associated with bipartisanship.

H3a. The degree of state cultural tightness moderates the anxious attachment-bipartisanship relationship, in that the relationship between anxious attachment and bipartisanship is stronger in tighter states compared to looser states.

H3b. The degree of state cultural tightness moderates the avoidant attachment-bipartisanship relationship, in that the relationship between anxious attachment and bipartisanship is stronger in tighter states compared to looser states.

4. Methodology

We first compiled a list of politicians (i.e., Representatives and Senators) who served in four past (113th–116th) congresses, including demographic information such as gender, age, and party affiliation, based on information provided by public government sources (https://congress.gov) to test our hypotheses regarding politicians' personality traits, cultural tightness-looseness, and group conformity.

Secondly, we obtained estimates of each politician's attachment orientations and Big Five personality dimensions by extracting information from the politicians' public and official Twitter profiles. By using a linguistic analytics approach, we exploited information about the syntax and semantics of a language as well as lexicons to generate our estimates of a politician's personality. It is important to note that

inferred traits – including attachment orientations and Big Five used as controls (see below) should not be interpreted as a direct measurement of actual personality (e.g., as is done using self-report assessments). Rather, the presented approach merely accounts for the expressions of traits based on textual data.

Based on a total of 759 unique Twitter profiles, the personality traits of 609 representatives across four Congresses were derived (80.23 %). This discrepancy was mainly due to inactive Twitter accounts. We used two machine learning-based algorithms to estimate each politician's attachment orientation and Big Five personality scores. Specifically, the attachment orientation algorithm we applied is based on the work of Karanatsiou et al. (2022), and we used the IBM Watson Personality Insights algorithm (Gliozzo et al., 2017) to estimate the expressions of each politician's Big Five personality traits. These algorithms, and other control measures, such as national economic conditions and cultural norms on the state level, are described below as part of our overall analytics and computational process.

4.1. Measures

4.1.1. Bipartisanship

The Lugar Centre and Georgetown University's McCourt School of Public Policy provide a bipartisan voting score for past and current Congresses (Lugar Centre, 2020). The bipartisan score is an objective measure that reflects whether a politician co-sponsors a bill introduced by the opposite party and the frequency with which the politician's own bills attract co-sponsors from the opposite party. This measure focuses on co-sponsorship because it provides an objective measure of partisan vs. bipartisan behavior. Political scientists consider co-sponsorship to be a public declaration of where a legislator stands on a given issue (Rice et al., 2021). Lower bipartisan scores represent sponsorship of partisan bills indicating a reluctance to work with opposing parties, whereas higher scores represent sponsorship of bipartisan bills indicating a willingness to work with opposing parties. Based on the computation of the bipartisan score, working with opposing parties also constitutes voting against one's own party. For this study, we considered bipartisan scores of politicians serving in the House of Representatives and Senate ($M = -0.08$, $SD = 0.75$).

4.1.2. Attachment orientations

A personality inference model based on a machine learning approach was used to predict attachment orientation scores based on provided self-report personality trait scores of a sample of participants and their respective Twitter data history. This model was developed by Karanatsiou et al. (2022) and uses language features (i.e. language expression and vocabulary or phrases) and predicts attachment scores based on the Experience in Close Relationships scale (ECR) as adapted by Richards and Schat (2011). A score is provided for each attachment orientation, namely anxious attachment (18 items, $M = 0.43$, $SD = 0.03$) and avoidant attachment (18 items; $M = 0.50$, $SD = 0.02$). After extracting language features from politicians' Twitter data, we applied the pre-trained model to annotate our dataset. To be included in our sample, politicians had to have posted a minimum of 100 tweets. Average tweet count for members of Congress was 5099.99 ($SD = 3838.31$). A comprehensive step-by-step outline of this algorithm is provided in Appendix A. Full details regarding the model building and annotation process can be found in Karanatsiou et al. (2022).

4.1.3. Cultural looseness-tightness

We obtained the state-level measure of tightness ($M = 49.39$, $SD = 13.39$) from the Harrington and Gelfand (2014) study. These authors used archival data to create their nine-item measure of state-level tightness. Four items in their measure reflected the strength of punishment in the legal system of the state, two items reflected permissiveness toward alcohol and same-sex relationships, two items reflected morality, and the final item was the percentage of foreigners in the state.

4.2. Control variables

4.2.1. Big Five personality traits

We used the IBM Watson Personality Insights system (Gliozzo et al., 2017) to obtain each politician's Big Five personality scores. IBM Watson uses linguistic data available on social media, including Twitter, to infer and predict personality characteristics. It uses an open-vocabulary machine-learning algorithm to compute raw personality scores. The raw scores are compared to a reference population of 1,000,000 previously assessed individuals. IBM Watson provides researchers with normalized percentile personality scores instead of the raw scores (Kern et al., 2019).

The IBM Watson algorithm also provides six individual facets for each Big Five personality dimension (Gliozzo et al., 2017). Based on previous research (Anglim et al., 2020), we based our analyses on individual facets rather than IBM Watson provided broad trait scores (see Table 1) since facets provide moderate levels of incremental prediction over the broad traits. We combined all the facets into higher-order Big Five personality dimensions (all Cronbach $\alpha \geq 0.70$), except for one facet in the Openness to Experience dimension (see Tables 1 and 2).

4.2.2. State-level conservative ideology

While previous research has found no difference between liberals and conservatives in terms of partisan bias (Ditto et al., 2019), there is a moderate correlation between state-level tightness-looseness and state-level conservative ideology (Harrington & Gelfand, 2014). To exclude conservatism as an alternative mechanism driving our results, we included the state-level "Conservative Advantage" measure provided by Gallup. Conservative advantage is a measure (in percentage points) derived by subtracting the percentage of liberal voters from conservative voters per state. Lower (incl. negative) scores indicate a minority of conservative voters, whereas higher scores indicate a majority of conservative voters. Data for this measure was obtained from the years 2012 (preceding the inauguration of the 113th Congress in 2013), 2014 (preceding the inauguration of the 114th Congress in 2015), 2016 (preceding the inauguration of the 115th Congress in 2017), and 2018 (preceding the inauguration of the 116th Congress in 2019).

4.2.3. Demographics

We also included several demographics in our analyses because they might relate to either our main predictors or our dependent variable (i.e., bipartisanship). These demographics include gender, age, and party affiliation.

4.2.4. Economic conditions

Representatives tend to focus on core partisan issues and on serving their core partisan constituencies during difficult economic times (Trubowitz & Mellow, 2005). Hence, we controlled for the change in the unemployment rate ($M = 4.87$, $SD = 1,15$) between Congresses.

4.3. Statistical analysis

We analyzed our data by using a multi-level cross-classified mixed-effects random intercept model. This analysis allowed us to account for the multi-level nature of our data. Level 1 was at the individual level of analysis and this level allowed us to account for the years of bipartisan data available for each politician. Level 2 was at the state level of analysis. We controlled for these levels of analysis to account for the non-independent observations in our data (Rabe-Hesketh & Skrondal, 2008).

5. Results

Summary statistics and pairwise correlations are shown in Table 1.

Table 2 contains the results of the multi-level mixed-effects regression that we ran to test the attachment orientation hypothesis (H1 and

Table 1
Zero-order pairwise correlations.

	Variables	M	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1)	Bipartisanship	−0.08	0.75	–												
(2)	Anxious Attachment	0.43	0.03	−0.07**	–											
(3)	Avoidant Attachment	0.50	0.02	0.06*	0.05	–										
(4)	Openness	0.64	0.07	0.03	0.07**	−0.12***	(0.65)									
(5)	Conscientiousness	0.85	0.06	0.01	0.07**	−0.18***	−0.09***	(0.83)								
(6)	Extraversion	0.56	0.08	0.14***	−0.23***	0.01	−0.11***	0.42***	(0.77)							
(7)	Agreeableness	0.75	0.09	0.19***	−0.03	−0.15***	−0.02	0.62***	0.62***	(0.85)						
(8)	Neuroticism	0.13	0.08	−0.05	−0.02	0.16***	0.10***	−0.82***	−0.62***	−0.70***	(0.94)					
(9)	Age	62.5	11.08	−0.08**	−0.06*	0.03	−0.02	−0.01	−0.14***	−0.11***	0.09***	–				
(10)	Gender	0.80	0.40	0.03	−0.08*	0.04	−0.07**	0.11***	0.11***	0.05	−0.06*	−0.011	–			
(11)	Unemployment	4.87	1.15	−0.13***	−0.12***	0.15***	−0.07**	−0.05*	−0.02	−0.07**	0.06*	0.14***	0.04	–		
(12)	State Tightness-Looseness	49.38	13.39	−0.11***	−0.03	0.03	−0.17***	0.17***	0.16***	0.14***	−0.10***	−0.03	0.21***	0.00	–	
(13)	Party Affiliation	1.51	0.50	0.07**	−0.17***	0.08**	−0.12***	0.15***	0.31***	0.20***	−0.11***	−0.09***	0.28***	0.01	0.44***	
(14)	State Conservatism	13.33	10.16	−0.10***	−0.08***	0.08***	−0.19***	0.17***	0.18***	0.15***	−0.10***	0.01	0.17***	0.17***	0.82***	0.49***

Note: Gender: Female (0) and Male (1); Political party affiliation: Democrat (1) and Republican (2); Cronbach alphas on diagonal in parentheses, where applicable; n = 1598 observations (609 politicians).
*** $p < .001$.
** $p < .01$.
* $p < .05$.

Table 2
Main regression analyses.

	M1	M2	M3
Main variables			
Anxious Attachment	−2.44**	−2.54**	−2.11*
	(0.88)	(0.91)	(1.03)
Avoidant Attachment	3.82*	3.94*	4.48**
	(1.56)	(1.54)	(1.54)
Age		−0.00	−0.00
		(0.00)	(0.00)
Gender		0.03	0.06
		(0.07)	(0.06)
Control variables			
Openness to Experience			−0.30
			(0.37)
Conscientiousness			−0.42
			(0.82)
Extraversion			0.20
			(0.43)
Agreeableness			2.77***
			(0.49)
Neuroticism			1.47*
			(0.61)
Unemployment			0.10***
			(0.04)
State Tightness-Looseness (STL)			−0.01*
			(0.00)
Political Party Affiliation	0.08	0.06	0.05
	(0.10)	(0.11)	(0.10)
State Conservatism	−0.00	−0.00	0.00
	(0.00)	(0.00)	(0.01)
Time	0.12***	0.12***	0.22***
	(0.01)	(0.01)	(0.04)
Constant	−14.48***	−14.42***	−28.36***
	(1.95)	(2.03)	(4.74)

Note: Gender: Female (0) and Male (1); heteroscedastic robust standard errors in parentheses; n = 1598.
*** $p < .001$.
** $p < .01$.
* $p < .05$.

H2). Model 1 (M1) contains the main variables, attachment orientations, while control variables are added in subsequent models (M2–M3).

Anxious and avoidant attachment was significantly and negatively (positively) associated with bipartisanship throughout all models (M1–M3). Even when controlling for other demographics, Big Five personality traits, and economic conditions, these relationships remained unchanged (Table 2, M3; anxious attachment: $b = -2.27$, $SE = 1.10$, $z = -2.06$, $p = .040$; avoidant attachment: $b = 4.61$, $SE = 1.61$, $z = 2.86$, $p = .004$). These results provide support for H1 and H2.

Finally, as shown in Table 2, and consistent with H3, there was a significant negative main effect for cultural looseness-tightness ($b = -0.01$, $SE = 0.003$, $z = -3.43$, $p = .001$) on bipartisanship. Politicians were less likely to be bipartisan when they came from tighter states.

5.1. The moderating role of looseness-tightness cultures

In addition, we examined cultural tightness as a moderator. Results are shown in Table 3.

The interaction between politicians' state-level looseness-tightness scores and anxious attachment was a significant predictor of bipartisanship ($b = 0.15$, $SE = 0.05$, $z = 2.82$, $p = .005$). To better understand this interaction, we graphed this interaction (+/− 1SD).

Fig. 1 shows that, as expected, bipartisanship is highest for low anxiously-attached politicians from culturally-loose states. Highly anxiously-attached politicians from culturally-loose states were less likely to engage in bipartisan behavior, and this difference was statistically significant ($\chi^2(1) = 14.72$, $p < .001$). There was no significant difference in bipartisanship between low and high anxious attached

Table 3
Subsequent analyses.

	M1
Anxious Attachment	−9.27***
	(2.61)
Avoidant Attachment	3.17
	(6.73)
State Tightness-Looseness	−0.09***
	(0.06)
State Tightness-Looseness × Anxious Attachment	0.15**
	(0.05)
State Tightness-Looseness × Avoidant Attachment	0.03
	(0.13)
Time	0.22***
	(0.03)
Constant	−24.60***
	(6.08)

Note: Model includes all control variables as displayed in Table 2; heteroscedastic robust standard errors in parentheses; n = 1598.
*** $p < .001$.
** $p < .01$.

politicians in culturally-tight states ($\chi^2(1) = 0.00$, $p > .95$). State-level cultural tightness overpowered the effect of individual attachment orientations on bipartisanship. Bipartisanship was uniformly lower in culturally-tighter states.

Further, bipartisanship for low anxiously-attached politicians significantly differed in culturally-loose versus culturally-tight states ($\chi^2(1) = 10.07$, $p = .0015$). Consistent with our hypothesis, state-level cultural tightness influenced bipartisanship for low anxiously-attached politicians. In contrast, bipartisanship for highly anxiously-attached politicians did not differ significantly in culturally-loose versus culturally-tight states ($\chi^2(1) = 2.53$, $p = .11$). Taken together, these results indicate that the anxious attachment-bipartisanship relationship is moderated by state tightness-looseness (H3a). The strength of the anxious attachment-bipartisanship relationship is contingent on the degree of state cultural tightness.

The interaction between politicians' avoidant attachment and state-level looseness-tightness scores was not significantly associated with bipartisanship (b = 0.03, $SE = 0.13$, $z = 0.23$, $p > .10$). Hence, we do not find support for H3b.

6. Discussion

In this paper, we examined the role of attachment orientations and cultural looseness-tightness in the bipartisan voting behavior of politicians over a four congress, or eight years, period. We found that politicians who were avoidantly-attached were more likely to be bipartisan whereas anxiously-attached politicians were less likely to be bipartisan. We also found that cultural tightness moderates the relationship between anxious attachment and bipartisanship.

Our attachment findings are consistent with previous literature. Previous research found that anxiously-attached individuals have an intense need for support and a fear of abandonment and rejection (Mikulincer & Shaver, 2007). In the world of politics, this appears to translate to anxiously-attached politicians voting more consistently with their political party. Perhaps these politicians are less bipartisan because they fear their voting behavior would be negatively interpreted and bipartisanship might increase the risk of being rejected by their party and their constituents. This fear by anxiously-attached politicians is likely enhanced in political parties in which compromise and bipartisanship are viewed as weak.

Furthermore, anxiously-attached individuals are also more likely to be sensitive to social cues and social threats, which causes such individuals to prioritize assurance-seeking and abandonment-avoidance (Spielmann et al., 2013) above all else. Such behaviors drive anxiously-attached individuals to rely heavily on others (Ein-Dor & Hirschberger, 2016). Perhaps this reliance on one's own political party makes politicians unwilling to entertain and vote for a wider range of ideas.

On the other hand, politicians who are predominantly avoidantly-attached engaged in more bipartisanship and supported co-sponsored bills. It seems that avoidantly-attached politicians would "reach across the aisle" and collaborate with members of the other party. These findings are in line with previous literature, which showed that avoidantly-attached individuals have a strong drive for independence and autonomy (Gruda et al., 2022; Gruda & Kafetsios, 2022; Kafetsios & Gruda, 2018).

This behavior is also consistent with prior findings that avoidantly-attached individuals tend to keep their distance from fellow group members due to fear of losing autonomy (Noftle & Shaver, 2006). Additionally, avoidantly-attached individuals have been found to reduce their distress and negative emotions in groups by engaging in relational distancing efforts as a coping mechanism (Fraley et al., 2015).

Of course, personality traits do not operate in a vacuum; understanding the contexts in which traits guide behavior is crucial. Hence, our focus on state-level cultural-tightness, which we found also directly affects bipartisanship. Politicians from culturally-tighter states were less

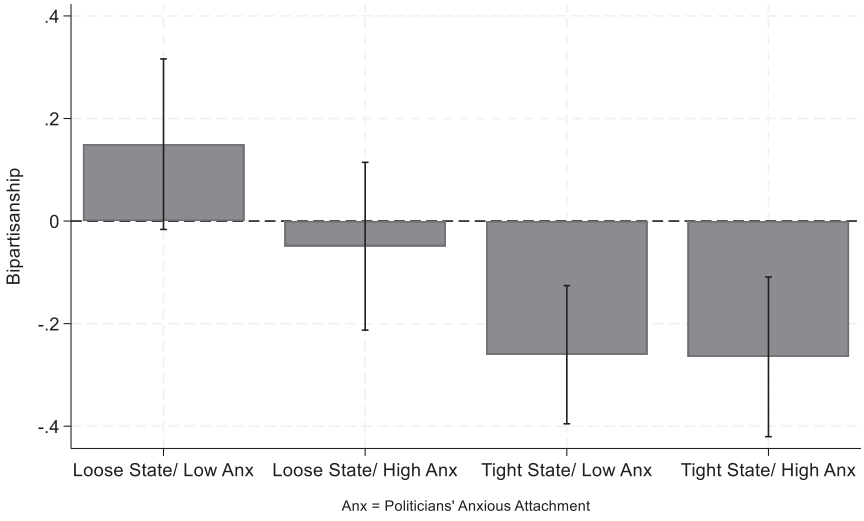

Fig. 1. Regression interaction between anxious attachment and state culture on bipartisanship.
Note: Predictive margins (with 95 % Confidence Intervals in parentheses).

likely to be bipartisan than politicians from culturally-looser states. We also found that cultural looseness-tightness moderated the anxious attachment-bipartisanship (but not the avoidant attachment-bipartisanship) relationship. Put differently, the positive anxiously-attached-bipartisanship relationship found in culturally-looser states diminished as cultural-tightness increased. Conversely, anxiously-attached politicians were less likely to engage in bipartisanship even in culturally-looser states. This reduction in bipartisanship from politicians from culturally-tighter states may be due to a fear of losing their party's and constituents' support.

7. Limitations and future research

This paper is not without limitations. One limitation of the present study is that using public Twitter profiles to assess politicians' personalities could be misleading. There is no guarantee that tweets were written by the politicians themselves. Oftentimes, politicians hire social media managers or entire teams to post, edit, and manage online posts (Draper, 2018). However, politicians are public figures who worry about their public image. They likely exercise oversight to ensure social media platforms such as X (formerly known as Twitter) project their desired identities as a politician and not necessarily their true personal selves. Constituencies vote for politicians that represent their interests in Congress and they base their vote on the public persona of politicians, not politicians' "actual" traits. Hence, traits expressed in tweets would provide an expected consistency between politicians' tweets and voting (bi)partisan voting behavior. While other sources could be considered as well, including TV interviews or speeches during rallies or town hall meetings, we decided against including such data for two main reasons. First, there is a potential issue of data skewness as not all politicians receive equal opportunities for TV appearances. Often, invitations for TV interviews are extended to politicians who are already well-known or have made controversial statements. This limitation could restrict our data pool and possibly introduce bias. Additionally, while town hall meetings and rallies could offer useful insights, the content of these events is often more tailored to the specific audience, possibly affecting the generalizability of the findings. We argue that, due to the broad public nature and the extensive availability of tweets, X (formerly Twitter) provides a consistent platform for politicians to express their views, making it a suitable medium for our analysis.

In addition, it is crucial to consider the unique interpersonal dynamics of elected officials. Members of Congress, adept in navigating complex social landscapes, might display degrees of anxious and avoidant attachment orientations differing from the general population. Nevertheless, our results are in line with prior literature on the link between attachment and group member behaviors and seem to extend in the examined political sample as well. However, we acknowledge that the nuances of a politician's public and private personas could influence this relationship. This consideration is vital in interpreting our findings and in understanding the complex interplay between personal traits and political behavior in high-stakes environments such as national politics.

8. Conclusion

We examined how relational traits and cultural looseness-tightness influence politicians' voting behavior using a machine learning approach. We provided insight into actual political outcomes by demonstrating that avoidantly-attached representatives are more likely to support partisan bills than their fellow party representatives. We also showed that the effect of relational traits is moderated by the cultural looseness-tightness of the state the Congressional members represent.

CRediT authorship contribution statement

Dritjon Gruda: Conceptualization, Formal analysis, Methodology, Project administration, Writing – original draft, Writing – review & editing. **Paul Hanges:** Methodology, Writing – review & editing. **Eimante Mikneviciute:** Writing – original draft. **Dimitra Karanatsiou:** Data curation, Methodology, Resources, Validation. **Athena Vakali:** Resources, Software, Supervision.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

Appendix A. Methodology for the inference of attachment orientations based on Karanatsiou et al. (2022)

I. Data Collection and Pre-processing

A total of 243 participants 3 (41.44 % female and 58.15 % male) were recruited via Amazon's Mechanical Turk. Average age of participants was 38.96 years (SD = 10.96). The average work experience was 15.37 years (10.26). Participants filled out a survey reporting their attachment orientations using the "Experiences in Close Relationships" scale. Participants also provided their public Twitter accounts. Only participants with high approval ratings and from specific geographic locations (e.g., the United States) were considered to ensure data quality. The final sample included 229 participants with almost 350,000 tweets (Karanatsiou et al., 2022).

II. Feature Engineering for Attachment Orientation Inference

Features reflecting user expressivity, interactivity, and general platform utilization were extracted from profile metadata and normalized. For linguistic features, techniques like Tf-Idf vectors, N-grams, and syntactic features were employed. Dimensionality reduction was applied to reduce sparsity and optimize the dataset for machine learning. Finally, emotions expressed in tweets were captured using a hybrid approach of textual attributes, emoji analysis, and sentiment scores.

III. Attachment Orientation Prediction Using SVM:

A Support Vector Machine (SVM)-based emotion classifier, trained on the SemEval-2018 dataset, was utilized to annotate users' tweets in the study's dataset. It is a supervised machine learning algorithm primarily used for classification and regression tasks. Trained on a subset of the data, the SVM model determined the optimal hyperplane to classify users based on their attachment orientations.

The model ingested various features, including behavioral, linguistic, and emotional attributes, to predict attachment orientations for each user. To do so, the dataset was split into 80 %–20 % test-train datasets. Random forrest (RF) regressor was used as the base regression model. A (sub)set of features for each trait that led to higher accuracy was selected, in order to avoid model overfitting.

The Root Mean Square Error (RMSE) was used to measure model performance. Low RMSE scores suggest that a selected model is a reliable tool for predicting traits, in this case, based on the language used in social media posts. For anxious attachment, the RMSE is 0.216 on the test set and 0.190 on the training set, indicating the model's predictions were quite close to the true values, with slightly better performance on the training data. For avoidance, the RMSE is 0.181 for both test and training sets, showing a very consistent and accurate prediction across both (train-test) datasets.

Finally, results indicate that the highest accuracy in the machine learning model is achieved by utilizing different linguistic features.

Specifically, the model uses phrasal level language features (i.e., N-grams), to effectively predict anxious attachment traits. In contrast, for avoidant attachment, the model relies on syntactic level features, like Parts of Speech (POS), to achieve the best accuracy. The average RMSE across both traits suggests that the RF regression models outperform the baseline model significantly, indicating a stronger predictive capability (Karanatsiou et al., 2022).

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