

# Committed but Constrained: Explaining Why the Descriptive-to-Substantive Representation Link Weakens Over Time

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The core assumption behind affirmative action such as gender quotas is that descriptive representatives prioritize and continue to prioritize the groups they represent, presumably because they are more committed. Although this pattern is broadly supported in both theory and empirics, a recent line of work suggests that the substantive value of descriptive representation might diminish over time, crowding out group-based representation throughout a legislator's career. However, it remains unclear whether this emerges as a result of declining commitment to represent their groups or changing responsibilities as descriptive representatives become part of the political elite. Using a novel corpus of aligned text-audio data spanning more than two decades of legislative speeches in Denmark, I document two main findings for the political representation of women and lower social classes. First, in line with the existing literature, descriptive representatives, on average, prioritize and commit to representing their groups more than their counterparts do. Second, descriptive representatives deprioritize their groups' issues as they spend time in parliament, but they remain as engaged when they do raise their groups' policy issues later as they are at the beginning of their career. This suggests that the diminishing substantive value happens not because of vanishing group commitments but because of changing incentives and constraints that politicians face throughout their careers.

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## Introduction

It is commonly said that descriptive representatives prioritize issues important to their social groups more than non-descriptive representatives do (Dovi 2002). Since descriptive representatives share social backgrounds and experiences with their social groups, they are presumably more motivated and committed to representing their groups, leading them to prioritize their groups' issues and interests (Phillips 1998). This pattern is regularly supported in empirical studies, suggesting that inequalities in political representation can be efficiently reduced by increasing the presence of representatives from disadvantaged groups through, for example, gender quotas (Krook 2010) or redistricting (Canon and Posner 1999).

The efficiency of descriptive representation has been questioned by a recent line of work positing that the value might diminish over time (Bailer et al. 2022; Hargrave 2023). According to these studies, legislators prioritize issues related to their descriptive characteristics at the beginning of their careers, but this diminishes substantially as they spend time in parliaments, seemingly crowding out the effect of descriptive representation. Using parliamentary questions and speeches to measure substantive representation, this pattern is shown for migrant, lower social classes, and youth representatives in the Bundestag (Bailer et al. 2022) and women in the House of Commons (Hargrave 2023).

Why does the substantive value of descriptive representation seem to weaken over time? On the one hand, the decline could be explained by vanishing group commitments, that is, *the emotional engagement and intensity with which a group's policy issues are raised*. Representatives from disadvantaged groups are commonly assumed to be more committed to representing their groups, but as legislators spend time in parliament, this motivation might change, waning their commitment to representing social groups. On the other hand, it might also be explained by the incentives and constraints legislators face at different career stages (see, for example, Bailer and Ohmura 2018), leading to a change in their group priorities, that is, *the attention devoted to a group's policy issues*. As legislators acquire seniority, they gain credibility (Davidson 1969), ac-

crue expertise (Pereira and Öhberg 2024), and hold positions (Wüst 2014), all of which influence their incentives and constraints in different ways. Gaining credibility and accruing expertise incentivize legislators to diversify their portfolios (Hargrave 2023), and holding positions constrains their selective prioritization of issues (see, for example, Hjorth 2022), each possibly changing a legislator's priorities without necessarily changing their commitments.

Each of these theoretical mechanisms credibly explains why the value of descriptive representation might decrease over time, yet leads to vastly divergent interpretations and implications for the design of representative institutions (see, for example, Broockman 2013). Previous studies have generally been unable to account for these competing explanations, primarily due to the inherent difficulty in measuring intrinsic and emotional behavior such as commitments. Existing approaches have tackled this problem using field experiments designed to manipulate the electoral incentives faced by legislators (Broockman 2013; Dinesen et al. 2021) or by using elite surveys with attitudinal measures (Sobolewska et al. 2018). While fruitful, these approaches are limited in time and space and do not permit studying how the substantive value of descriptive representation evolves as legislators gain seniority and parliamentary experience.

This paper seeks to answer whether the substantive value of descriptive representation diminishes over time and, if so, why. I measure issue attention and issue engagement with a novel empirical strategy proposed by Dietrich, Hayes, and O'Brien (2019) using the vocal pitch of a speech as an indicator of the emotional intensity of a speaker. The pitch is computed from audio recordings that, coupled with the corresponding text of a speech, can be used to proxy a politician's engagement around different policy issues. Using a comprehensive text-audio corpus of legislative speeches from 2000 to 2022 from Denmark's parliament, *Folketinget*, I use this approach in the context of the political representation of women and lower social classes, studying how their group priorities and group commitments evolve throughout their careers.

Two main findings are reported. First, in line with existing work on the descriptive-to-substantive-representation link, I show that descriptive representatives, on average, prioritize and commit to representing their social groups more than their counterparts do. This finding highlights the sub-

stantive value of descriptive representation. Second, as descriptive representatives spend time in parliament and become an established part of the political elite, they deprioritize their groups' priorities substantially, crowding out the effect of descriptive representation. However, this is not accompanied by vanishing group commitments. Descriptive representatives are as engaged when raising their groups' policy issues later as in the beginning of their careers despite devoting less attention to their groups' issues over time. In short, where group priorities, defined as issue attention and measured with frequency, change with the incentives, constraints, and responsibilities legislators face at different career stages, group commitments, defined as issue engagement and measured with vocal pitch, remain stable throughout their careers and invariant to incentives and constraints.

The divergent trajectories of priorities and commitments provide a unique perspective on the micro-foundations of the link between descriptive and substantive representation and carry substantially different implications for the design of representative institutions. On the one hand, the declining group priorities support the notion that the substantive value of descriptive representation is crowded out over time. This finding highlights the importance of parliamentary turnovers and term limits in sustaining the substantive value of descriptive representation. On the other hand, the stable group commitments suggest that descriptive representation remains valuable throughout the careers of politicians. In fact, what appears to be decreasing may be increasing. While descriptive representatives might deprioritize their groups' interests and issues over time, they might instead expand their substantive representation beyond the stereotypical policy issues associated with a social group as long as they remain committed while they spend time in parliament. Hence, the substantive value of descriptive representation might magnify over time, not diminish (see, for example, [Hargrave 2023](#)). This finding, in contrast, suggests that turnovers and term limits only work to contain, and possibly even diminish, the substantive value of descriptive representation.

## Group-based Representation and Legislative Careers

The relationship between the social background of elites and their behavior is widely theorized and tested in political science. This is often formulated using the concepts of descriptive and substantive representation (Pitkin 1967). A descriptive representative refers to a politician who shares one or more characteristics with a group of citizens. While the characteristic, in theory, could be anything such as smokers and non-smokers (see, for example, Burden 2007), we often take this to mean social groups, and often those who, historically, have been disadvantaged such as women, ethnic minorities, and religious groups (Gerring et al. 2023). Substantive representation refers to “acting for” and includes parliamentary activities such as floor speeches, committee work, or bill sponsorship. When used in the context of representation, any activities are viewed as representational in the sense they are pursued by the representative on behalf of, in the interest of, and because of the represented (Dovi 2006).<sup>1</sup> Within this conceptual framework, a political institution is considered descriptively representative to the extent that it mirrors the characteristics of the represented and substantively representative to the extent that it reflects the interests of the represented. And yet, these are often closely related.

The link between descriptive and substantive representation is among the most and regularly established in political science. This literature routinely demonstrates that descriptive representatives are more likely to improve the substantive representation for the social groups with whom they share characteristics. This relationship is not limited to one or few groups, to one or few parliamentary activities, or to one or few countries. Descriptive representatives are more likely to represent their social groups whether it is groups such as women, ethnic minorities, and social classes, activities such as roll-call voting, committee work, and floor speeches, or countries such as the US, the UK, or Germany (Swers 1998; Schwindt-Bayer 2010; Carroll et al. 1994; Pearson and Dancey 2011; Juenke and Preuhs 2012; Canon and Posner 1999; Grose 2005; O’Grady 2019; Carnes 2012).

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<sup>1</sup>Policy outcomes are excluded from the definition because the unit of analysis is an individual legislator whereas outcomes concern the decision of legislatures as a whole (Bratton and Ray 2002).

## *Competing Models of Group-based Representation*

Why do legislators who share one or more characteristics with a social group prioritize their group more? The literature generally points to two different explanations: presence and accountability.

The first mechanism, the *presence model* (Preuhs 2006), posits that descriptive representatives are more likely to prioritize their social groups because they share preferences, backgrounds, and experiences with the group members (Phillips 1998). This has also been formulated using the concept of “linked fate” (see, for example, Dawson 1995), encapsulating the idea that an individual’s life trajectory is inherently tied to the social group. According to these theories, shared experiences or linked fate translates into different motivations for descriptive and non-descriptive representatives. Descriptive representatives are said to be more dedicated, more motivated, and more committed to representing their group, leading them to prioritize their issues and interests more.<sup>2</sup> This suggests that the mere presence of representatives from disadvantaged social groups is sufficient to ensure that their substantive representation improves.

The second mechanism, the *accountability model* (Broockman 2013), suggests that descriptive representatives prioritize their groups not because they are committed but because of the electoral context. This mechanism is based on a rational-choice account of legislative behavior (see, for example, Mayhew 1974; Strøm 1997) predicting that descriptive representatives, regardless of their intrinsic motivations and commitments, prioritize their groups as long it is electorally beneficial. For instance, politicians with African-American background might champion the group’s interests but only to the extent they believe they are more likely to receive votes from African-American than Caucasian voters (Whitby 1997) or to the extent they feel electorally pressured (Mugglin et al. 2024). In this model, the substantive representation of social groups depends on the efficiency of the electoral accountability, or put differently, voters’ ability to punish or reward representatives based on their behavior.

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<sup>2</sup>Shared experiences are occasionally viewed as a distinctive mechanism from commitment (Sobolewska et al. 2018), but the former often precedes the latter in the causal chain of the presence model (see, for example, Broockman 2013).

While the two models identify competing theoretical mechanisms linking descriptive to substantive representation, they each emphasize the role of motivations. Where the presence model points to descriptive representatives being intrinsically motivated, the accountability model highlights the role of extrinsic motivations (see, for example, Geese and Schwemmer 2019). This difference has substantial implications for political representation. The intrinsic foundation in the presence model, for example, expects politicians to act as “surrogate” representatives (Mansbridge 2003; Wolkenstein and Wratil 2020) independently of the electoral incentives. The accountability model, in contrast, expects politicians to primarily prioritize interests and issues that help fulfill their electoral and office goals. This suggests that representation is district or party oriented.

Despite these fundamental differences, the competing models often generate the same empirical prediction (Grose 2005; Broockman 2013; Sobolewska et al. 2018). In both models, descriptive representatives are expected to prioritize their social groups more than their counterparts do but for different reasons. This prediction is summarized in the first hypothesis:

$H_1$ : Descriptive representatives, on average, prioritize their social groups more than non-descriptive representatives do.

I use the term “priorities” to denote *the attention devoted to a set of policy issues*. This is simply the frequency by which an issue is raised. Priorities are hierarchical and follow a zero-sum logic. It is hierarchical in the sense that prioritizing a policy issue means that the issue is devoted a higher share of attention than others. It is a zero-sum game in the sense that emphasizing one issue more by definition results in a deprioritization of one or more issues. In the context of group-based representation, priorities denote what activities politicians undertake to represent social groups substantively. I refer to this as *group priorities*. Prioritizing a social group follows a frequentist logic: The more politicians talk about women’s issues in their speeches, the more they sit on committees dealing with women’s issues, and the more they introduce bills on women’s issues, the more they prioritize women’s interests and issues, and the more they represent women substantively.

The pattern implied by the first hypothesis is agnostic as to why group priorities might differ between descriptive and non-descriptive representatives. However, the value of descriptive representation lies not only in the substantive representation itself but also in how it arises (Rittmann 2023). Affirmative action policies and institutional reforms, such as quotas and racial redistricting, aiming to reduce inequalities in political representation rest on the foundations of the presence model where descriptive representatives are said to work more for the substantive interests of social groups than non-descriptive representatives do because of their commitment to their group (Dovi 2002, p. 729). This leads to the second hypothesis:

$H_2$ : Descriptive representatives are, on average, more committed to representing their social groups.

What does it mean to be committed? The concept is rarely explicitly defined, but is often used synonymously or interchangeably with the notion of intrinsic motivation. Being “intrinsically motivated” is defined by Broockman (2013) as having “private preferences for others’ wellbeing” (Ariely et al. 2009, p. 544). A more extensive definition is offered by Giger et al. (2020) where intrinsic motivations are said to “signify behaviors driven by internal rewards, such as an innate desire to fulfill psychological needs or a desire for relatedness” (p. 495). This suggests that intrinsic motivation is more related to emotions than reason, more related to unintentional than intentional, and more related to instincts than strategy.

I use the term “commitments” to denote the *the emotional engagement and intensity with which a set of policy issues are raised*. I often refer to this as “group commitments” to make explicit that it relates to the engagement towards representing social groups. The definition has a strong emotional underpinning and resembles what Searing (1994) calls “emotional incentives” in his influential work on parliamentary roles. For Searing, the emotional incentives are the dominant force in a parliamentarian’s role selection, dominating considerations of, for example, career goals (Blomgren and Rozenberg 2015, p. 22). Searing identifies multiple roles, each having different emotional incentives. For example, the emotional incentives of the “constituency member” role are said to be a “sense of competence” and a “sense of duty” (Searing 1985, p. 376). A sense of



competence originates from being the “protector” of the local constituency and the sense of duty from a physiological satisfaction from redressing people’s grievances, both incentives legislators find internally and psychologically rewarding (p. 376-377). Group commitments operate similarly, providing politicians with emotional incentives to prioritize their social groups’ interests and issues.

### *Dynamic Models of Group-based Representation*

The emotional foundation of group commitments suggests that descriptive representatives, at any time, should prioritize their social group to fulfill their emotional incentives if they have the opportunity to do so. However, we also know from other work that the legislative context, political parties, and career goals might reinforce, rectify, or reduce the link between descriptive and substantive representation (see, for example, Childs and Krook 2009; Rocca and Sanchez 2008; Homola 2019; Miller and Sutherland 2023). For instance, measures of substantive representation based on policy outcomes might be confounded by the ideology of the majority coalition (Preuhs 2006). Similarly, measures based on legislative speeches might be confounded by party leaders’ strategic calculations determining legislators’ access to the floor (Proksch and Slapin 2012) or by the personal vote incentives provided by the different types of legislative debates (see, for example, Osnabrügge et al. 2021). The sum of this literature suggests that the substantive value of descriptive representation is conditional not only on the presence of descriptive representatives but also on the constraints and incentives that legislators face.

More recently, a new line of work suggests that another conditioner is politicians’ career paths (Bailer et al. 2022; Hargrave 2023). This literature is based on work theorizing how political careers dynamically shape the behaviors of political elites because each stage of the career presents a legislator with a new set of incentives and constraints (Bailer and Ohmura 2018). Using this work, it is argued that legislators’ representational activities should vary throughout their careers as a function of the motivations they hold, the constraints they face, and the incentives they encounter at the different stages. This pattern applies to each legislator, but the constraints and incentives faced at different career stages are expected to impact the group priorities of descriptive and non-

descriptive representatives heterogeneously. For descriptive representatives, the shifts imply that they prioritized their groups more at the beginning than later in their careers, seemingly crowding out the substantive value of descriptive representation over time. Using politicians' issue attention in parliamentary questions and speeches as a measure of group priorities, this theory is supported for migrant, low social class, and youth representatives in the Bundestag (Bailer et al. 2022) and women in the House of Commons (Hargrave 2023).

What explains this pattern? As freshmen, politicians lack credibility and expertise. To boost their re(s)election prospects, they undertake activities where they have prior competence to showcase their representational value to their constituents, party leaders, and colleagues. For descriptive representatives, these activities often align with their group commitments, creating a strong link between descriptive and substantive representation at the beginning of their careers. The early career alignment between group commitments and group priorities is not only a matter of motivational factors but also of party leadership and the division of labor within parliaments. When politicians are inexperienced, party leaders are more likely to assign them responsibilities related to their social identity, aligning their issue portfolio with their ex ante credibility and expertise. This is, for example, the case when women are assigned as spokespersons for children (Bäck and Debus 2019) and when women are assigned to committees dealing with “feminine” issues (Heath et al. 2005; Krook and O'Brien 2012; Goodwin et al. 2021).<sup>3</sup>

As politicians spend time in parliament, they gain credibility (Davidson 1969), accrue expertise (Pereira and Öhberg 2024), and hold positions (Wüst 2014) that each shift their incentives and constraints. Gaining credibility and accruing expertise incentivize descriptive representatives to diversify their portfolios (Hargrave 2023) without jeopardizing their re(s)election prospects (Davidson 1969). This is particularly important for descriptive representatives because it allows them to expand their representational capacity beyond their social identities (Bailer et al. 2022, 539). The same goes for the parliamentary positions. Politicians who share identities with disadvantaged

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<sup>3</sup>The so-called spokespersons (*ordfører*) are positions that are assigned within parties. A spokesperson acts and speaks on behalf of the party on relevant matters concerning “their” issue. This does not exclude other co-partisans from acting or speaking on the issue, but spokespersons are typically the dominant voice.

groups have historically been underrepresented in highly regarded positions such as government ministers (Krook and O'Brien 2012). This makes parliamentary positions an important dimension of group-based representation as they carry significant symbolic value. However, where the symbolic value of descriptive representation may increase, its substantive value might be reduced in the short run due to the responsibilities and tasks that come with holding a position and which functionally limits a legislator's selective prioritization of issues (see, for example, Hjorth 2022). Together, these mechanisms suggest that early career alignment between group commitments and group priorities weakens with the seniority of descriptive representatives, leading to the third hypothesis:

H<sub>3</sub>: Descriptive representatives prioritize their social groups less over time.

The pattern proposed by the third hypothesis implies a crowding-out effect of the substantive value of descriptive representation. This has found empirical support for migrants, lower social classes, and youth in the German Bundestag (Bailer et al. 2022) and women in the House of Commons (Hargrave 2023). This evidence is seemingly consistent with the accountability model. In this model, the descriptive-to-substantive representation link is sustained through accountability mechanisms ensuring that descriptive representatives remain incentivized and unconstrained to prioritize their groups. However, this pattern does not necessarily need to be at odds with the presence model. The main driver in this model is the group commitments of descriptive representatives that are assumed to translate into group priorities, improving the substantive representation of social groups. When this translation then weakens over time, it logically indicates that it happens due to vanishing group commitments, leading to part one of the fourth hypothesis:

H<sub>4a</sub>: The group commitments of descriptive representatives vanish throughout their careers.

This is not necessarily true. To see this, consider the example of being a government member. Being in government comes with positional responsibilities and expectations that functionally limit

a politician's selective prioritization of issues. For example, being a minister for fishery means that the politician must allocate a large share of their activities to issues related to "their" area. Indeed, this would shift their priorities, emphasizing some issues and de-emphasizing others. However, this need not imply that the politician has changed his or her commitments. That is, despite the functional constraints that come with office positions, descriptive representatives might still be as emotionally engaged to represent their social groups later as they were at the beginning of their careers, even though they might devote less attention to their groups' policy issues over time. If so, this would suggest that the group priorities and group commitments of descriptive representatives might follow different trajectories throughout their careers: the former declines, and the latter remains. This leads to part two of the fourth hypothesis:

H<sub>4b</sub>: The group commitments of descriptive representatives remain unchanged throughout their careers.

The patterns implied by the two competing hypotheses lead to different interpretations of the substantive value descriptive representation. Where the first (H<sub>4a</sub>) suggests that the diminishing substantive value is caused, or at least accompanied, by vanishing group commitments, the second (H<sub>4b</sub>) posits that the diminishing value is a result of constraints, not waning motivations. This difference is crucial. Intrinsic motivations are often assumed away in favor of extrinsic benefits such as reelection motives (see, for example, [Mayhew 1974](#)), primarily due to the inherent difficulty in measuring and theorizing about immanent preferences and concerns. Yet, even when re(s)election is the dominant goal ([Strøm 1997](#)), politicians have substantial leeway to prioritize issues and interests that go beyond the quest of winning votes ([Arnold 1990](#)). This leeway comes from the fact that politicians often win elections/seats by a margin of more than five percentage points ([Howell and Justwan 2013](#); [Ansolabehere et al. 1992](#); [Redmond and Regan 2015](#); [Luechinger et al. 2024](#)). Reelection concerns only decrease as they spend time in parliament. Over time, politicians become less sensitive to electoral incentives because seniority gives them a proven track record signaling competence and credibility ([Davidson 1969](#)), the so-called incumbency advantage ([Eggers and Spirling 2017](#)). If group commitments remain, the waning concern for reelection

suggests that descriptive representatives should find new avenues to substantively represent their social groups. This argument finds empirical support by [Hargrave \(2023\)](#). While women representatives deprioritize stereotypical “feminine” issues during their careers, they continue to raise women’s perspectives and identities on stereotypical “masculine” policy issues such as crime and trade (p. 16-17).

## Data and Measures

To answer why the substantive value of descriptive representation seemingly diminishes throughout the careers of politicians, I employ a novel measurement strategy developed by [Dietrich, Hayes, and O’Brien \(2019\)](#) using vocal pitch as a measure of a speaker’s emotional intensity. I first describe the dataset and corresponding empirical setting, then the selection and operationalization of social groups, and finally, the measuring of group priorities and group commitments.

### *Empirical Setting*

I study the descriptive-to-substantive representation link using parliamentary speeches from the Danish parliament, the Folketing. Parliamentary speeches are widely conceived as an important facilitator between descriptive and substantive representation of groups ([Osborn and Mendez 2010](#); [Dietrich and Hayes 2023](#); [O’Grady 2019](#); [Wäckerle and Castanho Silva 2023](#); [Mansbridge 1999](#)), particularly in party-dominated systems where legislators generally toe the party line in roll calls ([Schwarz et al. 2017](#)). Besides its substantive dimension, parliamentary speeches, more than any other type of speech, also provide a data source with a joint large-scale availability of both speech transcripts and speech recordings.

The empirical case of Denmark is useful for a number of reasons. First, audio recordings of parliamentary debates in the Folketing span two full decades, longer than many other audio archives of political speeches. This feature is important for this study as I explore how group priorities and commitments evolve when the *same* politician spends time in parliament. Crucially, within-analysis makes it possible to parse out potential replacement effects. Second, the span of the dataset means that the empirical setting provides considerable variation in the time spent in

parliament. Hence, it provides a valuable case for learning about the nature of the seniority of politicians. Third, Danish politics are notoriously known for being party centered, particularly in legislative voting where politicians, with only a few exceptions, do not toe the party line (Skjæveland 2001; Bøggild and Pedersen 2020). This makes it a useful case to explore the boundary conditions for when the descriptive-to-substantive representation link occurs and for validating the pitch-based measurement approach (Rittmann 2023).

### *Data*

To obtain data on parliamentary speeches, I rely on the corpus compiled in Rask and Hjorth (2024) that contains aligned text-audio data on parliamentary speeches given in the Danish parliament from October 2000 to September 2022. The speech transcripts – the text – and speech recordings – the audio – are aligned using an automated annotation procedure (Rask 2024). For this study, I preprocess the corpus to contain all speeches during the study period (1) that lie within the 2nd and 98th percentile in word length, (2) are given by legislators (excluding chairs), (3) where the text and audio of the speech are aligned, and (4) are given in parliamentary sessions with at least 5,000 total speeches.<sup>4</sup> This amounts to 432,653 speeches spanning seven election terms, 23 parliamentary sessions, and 2,105 legislative debates.

The corpus is augmented with biographical information obtained from the Danish Legislator Database (DLD) (Klint et al. 2023). The DLD contains demographic information such as gender, education, and birth year for all politicians elected at least once between 1849–2022 and corresponding election-level data on the election status of each politician in each election. This information allows for computing the debut date for each politician and subsequently the monthly, quarterly, or yearly seniority of a politician in a given speech.

The corpus contains a total of 656 legislators with 76% of the legislators being elected at least once. Based on the DLD, I remove legislators (1) who are never elected; (2) those who speak on the floor before being elected, for example, because they are permanent or temporary replacements;

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<sup>4</sup>This criterion is included to ensure that a nonparametric estimation of the effect of yearly seniority is sufficiently powered.

and (3) those speaking less than 50 times. This leaves 403 legislators in the data speaking in a total of 360,473 speeches, with the average legislator taking the floor 894 times and speaking with an average seniority of 8.67 years.

### *Selection and Operationalization of Social Groups*

I focus on the link between descriptive and substantive representation in the context of gender and social class.<sup>5</sup> The selection of two groups is motivated by the fact that the theoretical mechanisms are expected to apply to descriptive representatives of any minority group (see [Bailer et al. 2022](#)).<sup>6</sup> Gender and social class provide useful comparisons. While both groups contain substantial inequalities with women and lower social classes being disadvantaged in contemporary politics, their numerical underrepresentation, historical trajectories, and integration into the party system differ substantially. The latter provides an interesting theoretical variation. Historically, social classes have been built into party systems (see, for example, [Lipset et al. 1967](#)), making the working class less disadvantaged than, for example, ethnic minorities. This suggests that the substantive representation of classes has been sustained more by parties than individual representatives. Women, in contrast, who had not been integrated into the party system, were first granted suffrage at national elections in 1915. This suggests that the substantive representation of women is ensured more by the presence of individual women representatives than the presence of specific parties.

I measure the gender and class of each politician using the demographic information in the DLD. Gender is measured with the sex of a politician using an indicator variable where 1 indicates that the speaker is a woman and 0 that the speaker is a man. The average share of women representatives taking the floor ranges from 36% to 45% across the parliamentary sessions spanning

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<sup>5</sup>Ethnicity is not included because a quantitative analysis based on politicians in Folketinget is underpowered with only two percent being ethnic minorities in 2022.

<sup>6</sup>That is not to say that social groups are homogeneous. Social groups might be more or less minorities, more or less disadvantaged, and more or less heterogeneous, but the same trends are expected to operate. In formulating the presence model, [Phillips \(1998\)](#) argues, for example, that ethnic groups are more heterogeneous than women. While this certainly is true for the US context, this is not universal, varying from country to country, and is closely related to the size of the group. For example, ethnic minority legislators in Denmark are indeed more homogeneous than Black legislators in the US due to the size of the respective groups.

the study period but with a clear upward temporal trend. The social class is measured using the educational level of each legislator. I measure class with education rather than class (see, for example, O'Grady 2019) based on work suggesting that class cleavage in contemporary politics evolves around educational groups (Stubager 2009). A lower social class legislator is defined as one whose highest educational level is either primary school or vocational education. This is captured with an indicator variable where 1 denotes lower social classes and 0 otherwise. The average share of legislators from lower social classes taking the floor ranges from 9% to 22% but with a clear downward temporal trend. For both gender and class, 90% of the speeches are given by legislators with 20 years of experience or less and with only minor inequalities. For gender, the averages range from 8.54 years for women to 9.67 and 9.26 for men. For class, the averages range from 9.52 years for lower social classes and 9.16 for the higher social classes. See [Online Appendix A](#) for the empirical distributions.

### *Measuring Group Priorities*

Defining when a legislator represents a social group is challenged by the lack of a universal link between policy issues and groups (Childs and Krook 2009). Multiple approaches exist, ranging from inductive strategies where group issues are identified on the run (see, for example, Hargrave 2023) to more deductive measures where group interests are confined to stereotypical and narrow policy areas (see, for example, Bailer et al. 2022) or references to group members (see, for example, Pearson and Dancey 2011). I construct two measures of group priorities based on a deductive strategy using issue attention, that is, the frequency by which a policy issue is raised. The first measure is based on topic categories from the Comparative Agenda Project (CAP) and the second on topics identified with an unsupervised Structural Topic Model (STM). In the following, I elaborate on each measure.

### **CAP Measure**

The first measure replicates the measurement approach used by Bailer et al. (2022) and classifies the relevant group issues according to the CAP topic categories. The text-audio corpus does not



contain any key that links it directly to CAP. To circumvent this, the corpus is mapped to the CAP data by matching agenda descriptions using a combination of exact and fuzzy string matching. The classification approach proposed by [Bailer et al. \(2022\)](#) assigns issues to groups focusing on their stereotypical and material interests (p. 542). The Danish version of CAP is available from 1953 to 2016 across legislative activities such as bills, motions, and parliamentary questions ([Bonafont et al. 2020](#)). A detailed list of the CAP codes classified as group-specific policy issues concerning the interests of the groups is found in [Table 1](#). The CAP codes and descriptions are identical to [Bailer et al. \(2022\)](#). Using this measure, women’s and lower-class issues are prioritized in 2.7% and 4.7% of the speeches.

Descriptive feature	Policy issues
Women	200 general civil rights and liberties; 202 gender and sexual orientation discrimination; 332 infants and children; 508 parental leave and childcare; 1,208 family issues; 1,308 social benefits related to children
Lower class	302 insurance reform, availability, and cost; 335 prescription drug coverage and costs; 336 other or multiple benefits and procedures; 500 general labor and employment; 501 worker safety and protection; 502 employment training and workforce development; 503 employee benefits; 504 employee relations and labor unions; 505 fair labor standards; 506 youth employment; 603 education of underprivileged students; 1,302 poverty and assistance for low-income families; 1,406 low-income housing issues; 1,409 housing assistance for homeless and homeless issues

**Table 1:** Descriptive features and policy content according to the CAP coding scheme. CAP codes and descriptions are taken from [Bailer et al. \(2022\)](#) (Table 1, p. 543).

The matching procedure used to link the corpus and the CAP data was only possible for bills, motions, interpellations, and accounts. I was able to match 82.8% of the speeches to a CAP code given in any of these legislative debates. However, parliamentary questions (PQs) could not be matched since the corpus denotes the agenda of all questions as “question hour”, making the questions indistinguishable. This poses a problem for the empirical analysis. Unlike activities such as bills and motions, PQs are asked by legislators and are useful in showcasing their concerns ([Martin 2011](#)). In contrast, the agenda is fixed for all legislators taking the floor on, for example,

a bill proposed by the government. As a consequence, group priorities are measured at the agenda level.

### **STM Measure**

To accommodate the problems that come with measuring group priorities based on parliamentary agendas, I take advantage of the fact that legislators have the ability to frame policy issues within the fixed parliamentary agenda. Consider, for instance, a debate on a bill proposing to build affordable housing in the green areas of the Danish capital, Copenhagen. Within the same agenda, one legislator might emphasize the need for affordable housing for low-income families, while another emphasizes the negative impacts on biodiversity and the environmental consequences. As the example illustrates, speeches provide legislators with leverage to individually frame policy issues when they take the floor independently of the policy issue set by the agenda. Hence, legislators can frame policy areas in ways that align with their priorities and potentially their commitments.

To measure this, I exploit the fact that unsupervised topic models can model a single speech as a joint distribution of policy issues, taking into account both agenda-setting and framing effects (see [Ash et al. 2024](#) for a similar argument). Topic models are an example of a mixture where a single document  $n$  in a corpus  $\mathcal{C}$  with  $N$  total documents may consist of  $K$  topics. This makes the class of models ideal for measuring the group priorities of individual legislators in parliamentary speeches where the agenda is fixed. For each speech, the topic model identifies a weighted combination of policy issues set by the agenda and the individual MP. This is encoded in a  $N \times K$  matrix  $\Omega$  containing the distribution of topics for each speech  $d$ . This means that  $\Omega_{n,k}$  denotes the share of attention devoted to the topic  $k$  for the speech  $n$  with  $\sum_k^K \Omega_{n,k} = 1$ , meaning that a speech is modeled as a weighted combination of the  $k \in \{1, \dots, K\}$  topics. The higher the weight of the topic  $k$ , the higher the share. I define the dominant topic of a speech  $n$  as the topic  $k$  that occurs in the largest share of the speech. This corresponds to the topic  $k$  with the largest weight  $\Omega$  for speech  $n$ .

I estimate a topic model using the R implementation of the STM ([Roberts et al. 2014](#)) using  $K = 50$ . Upon estimation, I manually labeled the topics based on the topic keywords. I assigned labels

to 45 of the 50 topics, which is equal to 86.2% of the speeches. [Online Appendix B](#) provides details on the estimation and labeling of the STM. When topics are labeled, the topics are classified as pertaining to a group's interests. Like the CAP-based approach, I focus on narrow and stereotypical policy areas that are commonly associated with women and the lower class, respectively. I assign "gender and equality" to women and "workers and wages" to the lower social class. These are the dominant topics in 2.2% and 2.7% of speeches and on average constitute 1.478% and 1.891% of the speeches. The measure is validated in [Online Appendix C](#) comparing the CAP-based classification to the STM-based classification of group priorities.

### *Measuring Group Commitments*

I measure group commitments using a novel measurement strategy developed by [Dietrich, Hayes, and O'Brien \(2019\)](#) based on the emotional engagement and intensity with which a politician raises the policy issues of a group. The approach moves beyond strictly text-based measures of emotionality and instead uses audio recordings of political speeches to measure the emotional engagement in a speech based on changes in vocal pitch from a speaker's baseline. Positive values indicate that a speech has a higher average pitch than the typical speech and is interpreted as having a greater emotional engagement. When the speech recordings are aligned with the corresponding speech transcripts, this allows us to study the emotional engagement around different policy issues at the level of each politician. Using text-audio data from nearly 75,000 floor speeches in the US House from 2009 to 2014, they show that women representatives speak more frequently and more engaged than men when they reference their group. This pattern is replicated by [Rittmann \(2023\)](#) in another context using aligned text-audio data of  $\approx 33,000$  speeches from the German Bundestag from 2011 to 2020. Notably, the effect sizes are nearly identical in the two countries, suggesting that the approach generalizes across parliaments and political systems.

Beyond adding to the measurement validity of emotions expressed in political speech ([Cochrane et al. 2022](#)), the value of the approach lies in intrinsic motivations conveyed by the pitch. According to [Dietrich et al. \(2019\)](#), pitch is less controllable than conventional verbal measures such as speech topic, word choice, and roll call votes (p. 943). This argument is based on a physiolog-

ical model of the relationship between pitch and emotions in which a change in pitch is viewed as a causal response to a physiological reaction – such as a tightening of the vocal cords – to a speaker’s emotional state (Mauss and Robinson 2009). To be sure, the pitch is less controllable than measures such as word choice and alike. But it is also true that humans can deliberately emulate the effects of a physiological reaction (Banse and Scherer 1996). This creates an observational equivalence problem where the predictions from a physiological model of pitch are identical to a strategic account. Research on vocal expressions of emotions, almost without exception, relies on trained actors (Scherer et al. 2003). This makes it logically impossible that the pitch is entirely beyond the control of the speakers (Knox and Lucas 2021, p. 651), particularly for highly skilled speakers such as politicians who rehearse speeches, prepare for debates, and attend voice training to improve their appeal to voters (Damann et al. 2023). This means that the vocal pitch of politicians can also be used as a signaling device that may or may not provide a window into their personal commitments (Rittmann 2023). Online Appendix E provides a discussion of the scope of this argument and its implications for the measure.

I compute the vocal pitch using the R package communication (Knox and Lucas 2021), which estimates the  $F_0$  of an audio signal on windows of 25 ms with a slide of 12 ms. This means that a speech lasting 30 seconds yields a total of 2,400 estimates. The package computes this with two separate algorithms. I take advantage of this to account for measurement errors. An estimate is considered valid if both algorithms return a non-zero estimate. All non-zero estimates are then averaged to produce a single measure of the pitch for each speech. Finally, I z-standardize pitch at the MP level to account for voice heterogeneity between speakers (Dietrich et al. 2019; Rittmann 2023; Rask and Hjorth 2024; Rheault and Borwein 2019). The standardization implies that a speaker’s average pitch becomes zero, effectively removing physiological differences in the size of the vocal cords. A positive deviation from the baseline indicates greater emotional intensity than on average, whereas a negative deviation indicates less emotional arousal. The magnitude of the deviation captures the degree to which a politician is activated or subdued.

## Results

Do descriptive representatives prioritize and commit to representing their groups and continue to do so over time? In this section, I test each of the hypotheses set out in the paper empirically. I present the results in figures. The corresponding regression tables and robustness checks are found in [Online Appendix D](#).

*Do descriptive representatives, on average, prioritize their social groups more than non-descriptive representatives do (H1)?* As an initial test, [Figure 1](#) shows the monthly frequency of descriptive and non-descriptive representatives raising their groups' issues in their speeches and taking the floor in debates pertaining to their groups' interests. Gender is reported in the left column and social class in the right column. As expected, descriptive representatives raise and speak in agendas concerning their groups' issues substantially more than non-descriptive representatives, and they continue to do so over time. The difference between descriptive and non-descriptive representatives is more visible when group priorities are measured at the speech level (STM) and more or less stable over time with no clear trends for both groups and measures.

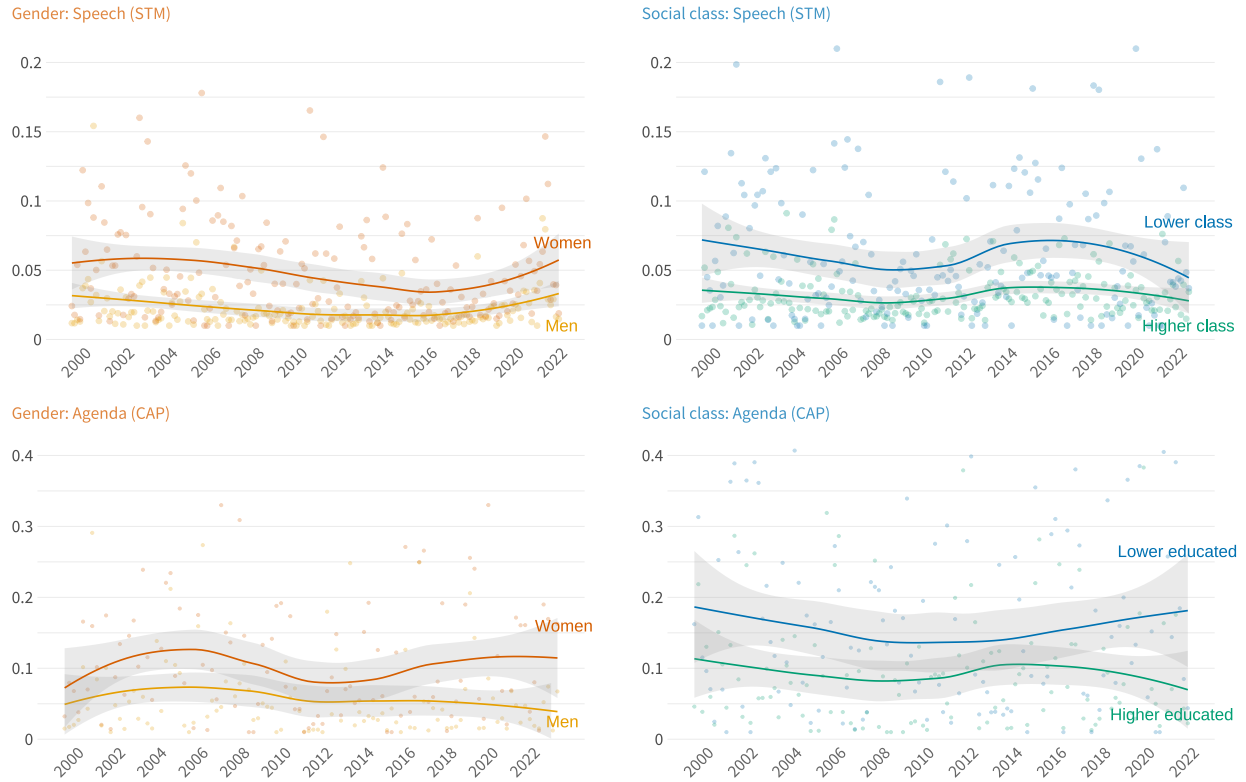
The formal test of the hypothesis is shown in the left panel of [Figure 2](#). Following the modeling strategy by [Rittmann \(2023\)](#), I estimate logistic multi-level regressions with random intercepts for each legislator. It is not possible to include fixed effects at the legislator level since the descriptive characteristics are time invariant. The outcome is either whether the legislator raises women's issues or issues related to lower social classes in their speeches (STM) or whether legislators take the floor on agendas concerning the interests of women or lower social classes (CAP). The predictor is whether the legislator is a woman/man or lower educated/higher educated. This yields a total of four models, one for each combination of group (gender/social class) and measure of priorities (STM/CAP). I report the coefficients for gender with  $\beta$  and the coefficients for social class with  $\theta$ . Each estimate shows the difference in probabilities between women and men and between lower educated and higher educated along with 90% and 95% confidence intervals. Positive values indicate that women/lower-educated legislators have higher probabilities, and negative values indicate

that men/higher-educated legislators have higher probabilities.

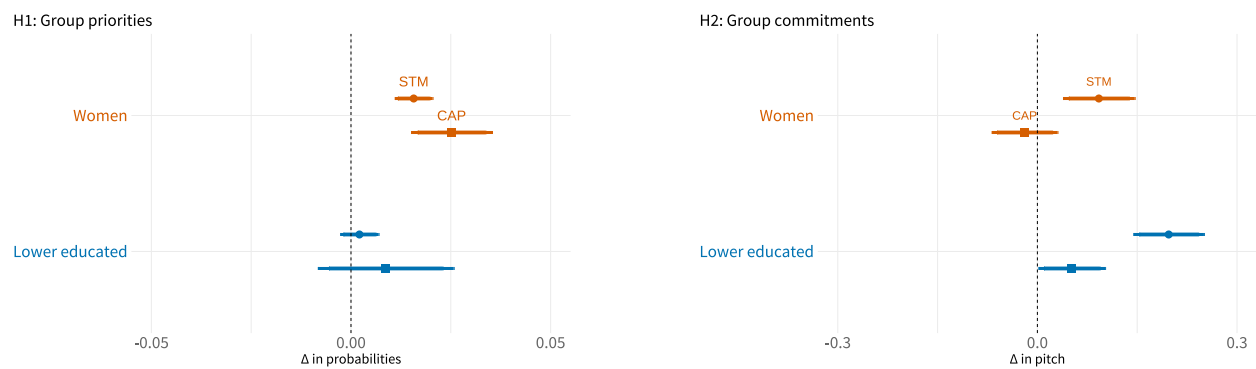
In line with the descriptive evidence, the results show that descriptive representatives, on average, take the floor and raise their groups' issues more than non-descriptive representatives do. The difference is more pronounced for women than lower educated and more pronounced when issues are measured at the agenda level (CAP) compared to the speech level (STM). The difference in probabilities for gender is approximately  $\hat{\beta}_{\text{cap}} = 2.52\%$  when measured at the agenda level and  $\hat{\beta}_{\text{stm}} = 1.57\%$  at the speech level, suggesting that women are more likely to advocate for the substantive interests of women. Both estimates are statistically significant at the 0.05 level, but the effect sizes amount to only 1/4 of the relationship estimated in the German Bundestag (Rittmann 2023) and US House (Dietrich et al. 2019). This difference is not explained by the choice of measurement. When using the dictionary approach developed by Pearson and Dancey (2011) to identify whether a legislator mentions women in a speech, the estimate is of the same magnitude ( $\hat{\beta}_{\text{dic}} = 2.3\%$ ). For social class, both estimates are in the hypothesized direction, but neither is statistically nor substantively significant. When measured at the agenda level, lower-educated legislators are  $\hat{\theta}_{\text{cap}} = 0.87\%$  more likely to prioritize issues related to lower social classes and only  $\hat{\theta}_{\text{stm}} = 0.21\%$  more likely when measured at the speech level.

Despite the differences between gender and social class, the empirical results of H1 support the notion that descriptive representatives, on average, prioritize their groups' issues more. What explains this pattern? Where the presence model points to differences in commitments between descriptive and non-descriptive representatives, the accountability model posits that the relationship is sustained by different incentives to represent social groups. For example, women might prioritize representing the substantive interests of women as they think it benefits them electorally because they believe it helps advance their office goals, or even because they are appointed to positions that constrain their prioritization of women's interests in their legislative speeches. Disentangling these mechanisms is crucial in interpreting the value of descriptive representation.

*Are descriptive representatives, on average, more committed to representing their social groups (H2)?* I investigate this question using the same modeling strategy as Rittmann (2023). I estimate



**Figure 1:** Monthly share of speeches raising women’s and lower-educated issues by descriptive and non-descriptive representatives. Issues are measured using STM (upper panel) and CAP (lower panel), respectively. The left panel shows the shares for women and men. The right panel shows the shares of lower-educated and higher-educated representatives. Lines are computed using local polynomial regressions (LOESS) with 95% confidence intervals. The y-axis is truncated at 0.20 for visualization purposes.



**Figure 2:** Tests of Hypotheses 1 and 2. The upper panel (*H1*) shows the difference in the predicted probabilities of talking about group issues for women compared to men and for lower educated compared to higher educated. The probabilities are computed from logistic multi-level regression models with random intercepts for each legislator. The lower panel (*H2*) shows the average difference in pitch when talking about group issues for women compared to men and for lower educated compared to higher educated. The estimates are from legislator fixed-effect regressions with z-standardized vocal pitch as the outcome. Squares denote the CAP measure and a circle the STM.

legislator fixed-effect regressions where the outcome is vocal pitch, z-standardized for each legislator, and the predictors are an interaction between whether the speech (STM) or agenda (CAP) is about women’s issues or issues related to lower social classes and whether the legislator is a woman or lower educated, including their main effects.<sup>7</sup> Recall that pitch is used as a measure of emotional arousal, with higher values indicating greater arousal and vice versa. In this context, changes in pitch are interpreted as variation in issue engagement. As for the modeling of H1, this yields a total of four different models, one for each combination of group (gender/class) and measure of priorities (STM/CAP). No covariates are included to make the estimates comparable to those from the Bundestag and the US House. The interaction coefficient is the main quantity of interest as it shows the difference in pitch between women and men when the speech or agenda concerns women, and between lower educated and higher educated when the speech or agenda is about lower-class issues. Positive values indicate that women/lower educated speak with a higher pitch than men/higher educated when speaking about women’s/lower-class issues.

The interactions are shown in the right panel of **Figure 2** along with 90% and 95% confidence intervals. In line with expectations, descriptive representatives speak with greater engagement when raising their groups’ issues in their speeches (STM). Starting with women, they speak with a pitch  $\hat{\beta}_{stm}^{DK} = 0.092$  standard deviation higher than men when raising women’s issues in their speeches. This is remarkably close to the effect sizes estimated in the Bundestag ( $\hat{\beta}_{dic}^{DE} = 0.073$ ) and US House ( $\hat{\beta}_{dic}^{US} = 0.094$ ), further validating the use of pitch as a proxy of issue engagement and strengthening the evidence of H2. This is even more accentuated for the social class, where lower educated legislators speak with a pitch  $\hat{\theta}_{stm} = 0.197$  standard deviation higher than higher educated legislators when raising issues related to lower social classes in their speeches.

The evidence presented so far is fully consistent with the foundations of the presence model. However, the pattern is less clear when group priorities are measured at the agenda level instead of the speech level. When lower-educated legislators take the floor on agendas concerning their

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<sup>7</sup>As noted by **Rittmann (2023)**, fixed effects are needed instead of random effects to estimate legislator-specific effects when the outcome is z-standardized at the same level. In that case, random effects are zero by the definition of z-standardization. This makes a multi-level regression with random effects identical to a pooled regression.



groups' interests, they speak with a pitch  $\hat{\theta}_{\text{cap}} = 0.052$  standard deviations higher than their average speech. This difference is statistically significant but, at the same time, substantially smaller than the STM measure. The estimate is also smaller for women and even negative ( $\hat{\beta}_{\text{cap}} = -0.019$ ). What does this imply for the support of H2? On the one hand, the difference between the two measures suggests that the commitment of descriptive representatives is conditional and sensitive to the measurement approach, weakening the support of the hypothesis and the mechanism proposed by the presence model. However, on the other hand, the differences might lean towards and arguably even reinforce the presence model. Where the CAP measure is defined by the parliamentary agenda often set by the government (see, for example, Hibbs 1977), the STM measure is defined at the speech level, allowing legislators to individually frame policy issues when they take the floor independently of the agenda. Legislators can use this leeway to emphasize and frame policy areas in their speeches that align with their underlying commitments within the fixed agenda. Based on this, the estimated null effect for the CAP measure combined with the highly significant effect for the STM measure further strengthens the support for the hypothesis, as the issues emphasized within speeches are expected to be more aligned with the group commitments of legislators than issues set by the parliamentary agenda.

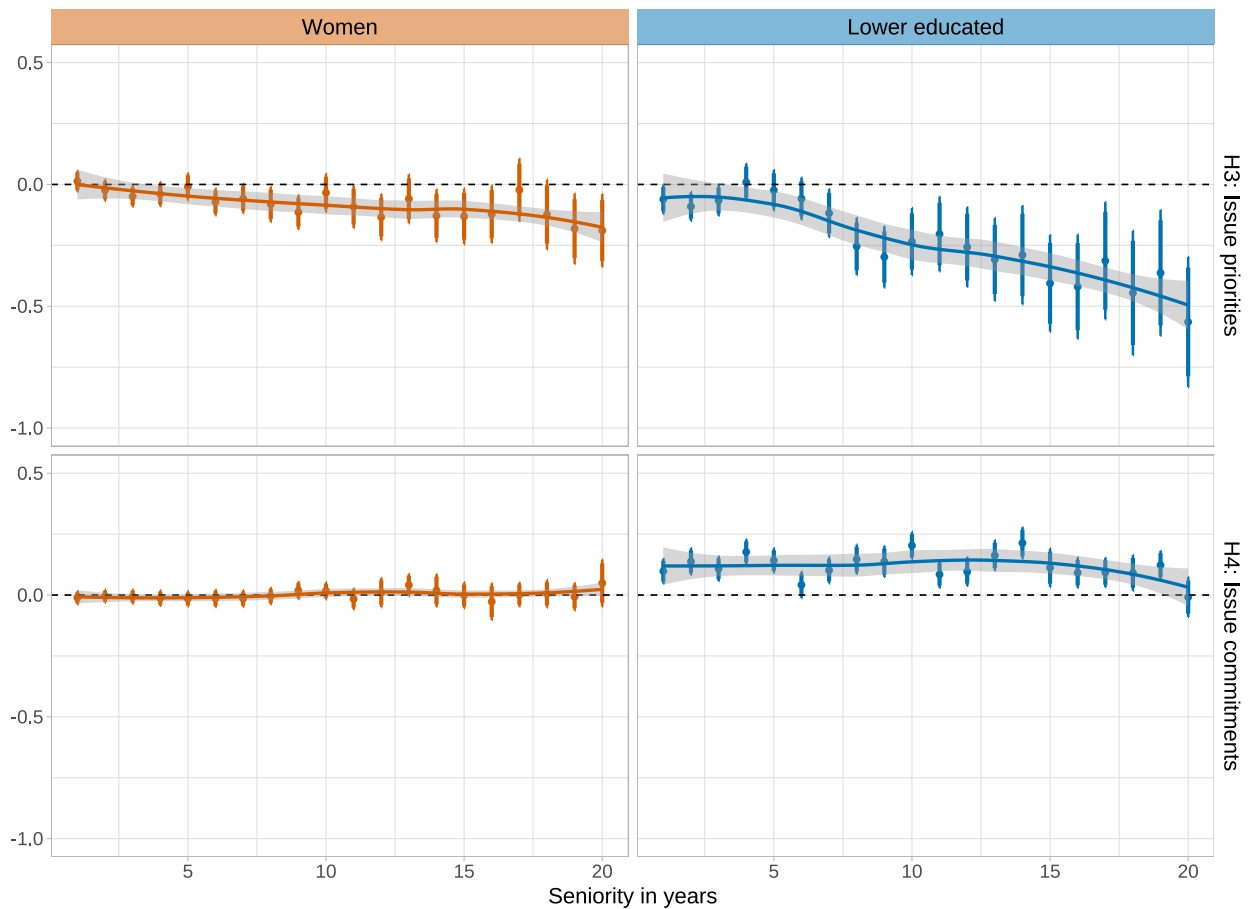
*Do descriptive representatives prioritize their social groups less over time (H3)?* I analyze this question using two-way fixed-effect regressions that include only descriptive representatives in the sample. I subset the data to include only descriptive legislators because no clear career effects are expected for non-descriptive legislators (see also Bailer et al. 2022). I include a fixed effect for each legislator to account for legislator-specific confounders such as their ideology, and election term fixed effects to account for any time-specific confounders such as the ideology of the governing coalition and its derived consequences. The legislator fixed effects make sure that any potential relationship is not explained by turnovers. The outcome is a z-standardized continuous measure of the share of group-related issues in a single speech. Based on the substantial differences between the STM and CAP measures in Figure 2, I test the hypothesis including only the speech-based STM measure. For the women model, a positive value indicates that the speech pays more

attention to “gender and equality” than the average speech. For the social class model, a positive value means that the speech pays more attention to “workers and wages” than the typical speech. The main predictors of interest are a set of indicators that capture the effect of a legislator having spent  $d \in \{1, \dots, D\}$  years in parliament compared to their first year. Following [Hargrave \(2023\)](#) and the distributions in [Figure A1](#), I set  $D = 20$  to ensure the estimation is sufficiently powered for each year of seniority. I also include indicators that capture whether the speech is given in an election year and whether the legislator is a government member to take into account positional constraints and electoral incentives. I report the coefficients for gender with  $\psi$  and the coefficients for social class with  $\lambda$ .

The results are presented in the upper row of [Figure 3](#). As expected by the hypothesis, the estimates for both gender and social class are negative and decline substantially throughout the legislative careers of descriptive representatives. During their first years in parliament, there is little to no difference in the group priorities. After their fifth year, women legislators raise women’s issues  $\psi_5 = -0.009$  standard deviations less compared to their freshmen year. For lower-class legislators, the difference  $\lambda_5 = 0.009$  is almost identical to the first year. However, after their tenth year, these differences are  $\psi_{10} = -0.114$  and  $\lambda_{10} = -0.298$ , respectively, both statistically and substantially significant. Finally, after 20 years in parliament, women representatives raise women’s issues  $\psi_{20} = -0.189$  standard deviations less compared to their freshmen years. For social class, this difference is  $\lambda_{20} = 0.565$  standard deviations, nearly twice the magnitude of women. The results support the notion that descriptive representatives raise their groups’ issues in their speeches less during their careers. This pattern exists for both gender and social class. As descriptive representatives gain seniority, their group priorities seemingly change, shifting their attention from the substantive interests of their groups toward other issues. The decline is almost entirely linear for women, with approximately half of the decline happening after their tenth year in parliament (58%). For social class, the decline is negligible for the first five years but then declines linearly throughout, also almost cut in half after the tenth year (53%).

These results are consistent with the patterns found in the Bundestag and the House of Com-

mons. In the UK, women representatives prioritize “feminine” policy issues such as “children and family” and “health” less in their speeches throughout their careers (Hargrave 2023). In Germany, legislators from a lower social class ask fewer parliamentary questions on class-related issues over time, but this pattern is not observed for women (Bailer et al. 2022). Like Hargrave (2023), I estimate a weakening link between descriptive and substantive representation for women, and like Bailer et al. (2022), the decline for women is significantly smaller than the decline for social class.



**Figure 3:** Test of Hypotheses 3, 4a, and 4b. The left column shows the tests for gender, and the right column shows the tests for social class. The upper row contains the tests for H3, and the bottom row contains the tests for H4a and H4b. The estimates of H3 capture the effect of spending  $d \in \{1, \dots, D\}$  where  $D = 20$  years in parliament relative to the first year. The outcome is the z-standardized share of group-related issues in a single speech. A separate model is estimated for women and lower social class including only descriptive representatives in the sample. The models are estimated with legislator fixed effects and fixed effects for each election term. The estimates of H4a and H4b capture the effect of spending  $d$  years in parliament relative to their first year on the emotional intensity when raising the group’s issues relative to other issues. As for H3, I estimate separate models for each group with two-way fixed effects and include only descriptive representatives.

What explains the seemingly vanishing link between descriptive and substantive representation? On the one hand, the diminishing value might be indicative of changing group commitments. Over time, legislators shift their intrinsic motivations and underlying commitments, crowding out the substantive value of descriptive representation. On the other hand, however, the decline might also be explained by incentives and constraints leading to a change in priorities but without necessarily changing the underlying commitments. While both explanations lead to a crowding-out effect, disentangling why this happens holds important implications for the substantive value of descriptive representation.

*Are descriptive representatives as committed later as at the beginning of their careers (H4)?* As for H3, I investigate this question using two-way fixed-effect regressions including only descriptive representatives. The outcome is vocal pitch, z-standardized for each legislator. As predictors, I include a measure of the z-standardized share of group-related issues in a single speech and a set of indicators capturing the effect of spending  $d \in \{1, \dots, D\}$  where  $D = 20$  years in parliament relative to the first year. The main predictors of interest are the  $D$  interactions between the share of group-related issues in a speech and the year dummies. The interactions capture how the commitment to issues pertaining to women or lower social classes changes as descriptive representatives gain seniority. If descriptive representatives remain committed (H4b), there should be no career dynamics and no visible time trend. If the commitment to representing their groups vanishes, however, the link should weaken over time causing a declining trend (H4a).

The results are reported in the bottom row of [Figure 3](#). Compared to the upper row, the estimates follow no clear trend, indicating that the group commitments of descriptive representatives, unlike their group priorities, are invariant to their career trajectories. The estimates from the women model generally fluctuate around zero throughout their careers with no systematic or visible changes. The estimates from the social class model are positive and significant across the different years of seniority. However, as evident by the trend line, this is driven entirely by the reference category – the first year in parliament – which appears to be an outlier. There is no plausible explanation for why legislators from lower social classes should be significantly less committed as

freshmen and then suddenly become committed as sophomores and remain committed throughout. Changing the reference category to year two yields a pattern almost similar to that for women.

The static and non-evolving group commitments stand in contrast to the dynamic and evolving group priorities. What does this mean for the link between descriptive and substantive representation? On the one hand, the pattern observed for group priorities suggests that the link between descriptive and substantive representation weakens throughout the legislative careers of representatives, crowding out the value of having women represent women and having lower-educated represent lower-educated. On the other hand, the career effects are observed only for group priorities but not group commitments. This discrepancy is important, and the pattern can not be explained by the accountability model or the presence model alone but rather by a combination of both. The dynamic and declining group priorities align with the empirical prediction of the accountability model where careers induce different incentives and constraints, shaping a legislator's priorities. In contrast, the static and stable group commitments align with the expectations from the presence model where the shared background and shared experiences create a long-lasting emotional commitment to represent their social groups.

This finding has positive implications for the substantive value of descriptive representation. While representatives from disadvantaged social groups might prioritize their groups less over time, this is not driven by vanishing group commitments but rather by positional or institutional constraints or changing incentives. In fact, the lasting group commitments indicate that descriptive representatives continue to raise their groups' issues and perspectives throughout their careers. A similar implication is proposed by [Hargrave \(2023\)](#) who found that women representatives prioritize the substantive interests of women less over time. Yet, they continue to raise the perspectives of women and shift the substantive representation away from "feminine" policy areas towards more "masculine" areas such as trade. In short, the link between descriptive and substantive representation weakens not because of commitments but more likely because of incentives and constraints.

## Conclusion and Discussion

The core assumption behind affirmative action policies such as gender or ethnic quotas is that descriptive representatives prioritize and continue to prioritize the groups they represent, presumably because they are more committed. While this pattern is broadly supported in both theory and empirics, a recent line of work suggests that the substantive value of descriptive representation might diminish throughout the careers of politicians, crowding out group-based representation (Bailer et al. 2022; Hargrave 2023). However, it remains unclear if this emerges due to declining commitment to represent their groups or rather changing responsibilities as descriptive representatives become part of the political elite.

In this paper, I ask why the substantive value of descriptive representation seemingly diminishes over time. I distinguish between group priorities, the attention devoted to a group's policy issues, and group commitments, the emotional engagement and intensity with which a group's policy issues are raised, and study how they change as politicians spend time in parliament. Using a novel empirical strategy that employs vocal pitch as a measure of emotional arousal (Dietrich et al. 2019) computed on more than two decades of audio recordings of parliamentary speeches from the Danish parliament, I document two main findings in the context of the political representation of women and lower social classes.

First, in line with existing work on the descriptive-to-substantive representation link, I show that descriptive representatives, on average, prioritize and commit to representing their social groups more than their counterparts do. This finding reiterates the substantive value of descriptive representation reported in numerous other studies. Second, the descriptive-to-substantive representation link weakens as politicians spend time in parliament. As descriptive representatives become an established part of the political elite, they deprioritize their social groups substantially, crowding out the substantive value of descriptive representation. However, at the same time, the diminishing substantive value is not accompanied by vanishing group commitments. Descriptive representatives remain as engaged when talking about their groups' policy issues later as they are

at the beginning of their career despite devoting less attention to their groups' issues over time. In short, where group priorities are dynamic, evolving, and declining, changing with the incentives, constraints, and responsibilities legislators face at different career stages, group commitments are static, fixed, and stable, remaining throughout careers and invariant to incentives and constraints.

What do these results imply for the value of descriptive representation? Although the substantive value of descriptive representatives weakens over time, this is not caused by vanishing commitments to representing social groups but by the constraints and incentives politicians face throughout their careers. This is important as it suggests that descriptive representatives are and remain intrinsically motivated to represent their social group. This holds implications beyond the substantive value of descriptive representation. The role of intrinsic-based behavior is often assumed away in studies of political elites (see, for example, [Mayhew 1974](#)), generally for theoretical purposes ([Arnold 1990](#)), yet it matters greatly as politicians often have room to maneuver their personal beliefs and commitments ([Broockman 2013](#), p. 533). This suggests that descriptive representatives might find new avenues to substantively represent their social groups as long as their group commitments remain ([Hargrave 2023](#)).

Beyond providing insights into the micro-foundations linking descriptive to substantive representation, the paper further validates the use of pitch to measure emotional arousal. The findings documented by [Dietrich et al. \(2019\)](#) in the US House and [Rittmann \(2023\)](#) in the German Bundestag are replicated in the Danish Folketing using a longer time period. This reinforces and expands the validity of the pitch-based measure. The paper also highlights the general advantages of using audio data to study social and political behavior. The recent literature has begun to move beyond speech transcripts to also use audio recordings ([Dietrich et al. 2019](#); [Ash et al. 2024](#); [Dietrich et al. 2019](#); [Boussalis et al. 2021](#); [Arnold and Küpfer 2024](#); [Knox and Lucas 2021](#); [Damann et al. 2023](#); [Rask and Hjorth 2024](#); [Tarr et al. 2023](#); [Rheault and Borwein 2022](#)). I add to this literature, demonstrating the usefulness of audio in measuring the affective dimensions of speeches. Lastly, replicating a result across countries adds to the notion that vocal behavior cuts through languages and cultures, reducing the necessity for multilingual models to measure affective behavior.

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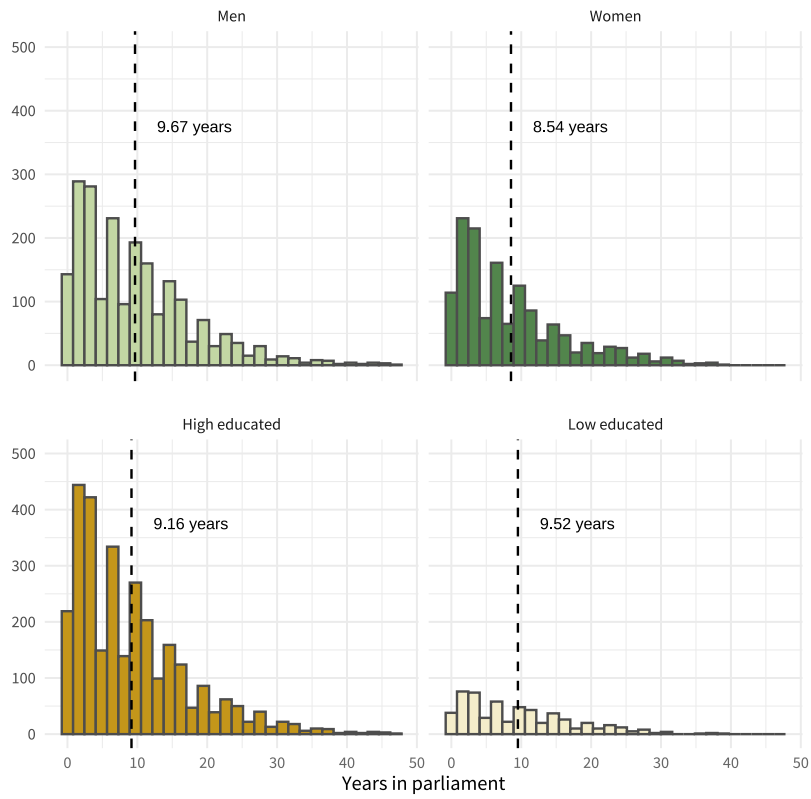


# Online Appendix

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A Distributions of Seniority



**Figure A1:** Distribution of parliamentary experience for gender and education. Dashed lines denote the average for each group.

## *B Structural Topic Model*

### **Estimation**

I estimate a topic model using the R implementation of the Structural Topic Model (STM) without any covariates (Roberts et al. 2014). Without covariates, this reduces to a Correlated Topic Model (CTM) where topics, in contrast to the independence assumption imposed in the canonical LDA algorithm (Blei et al. 2003), are allowed to correlate (Blei and Lafferty 2006). Like other unsupervised topic models, STM is sensitive to the number of topics  $K$  (Denny and Spirling 2018). To accommodate this, I estimate a series of models with  $K \in \{10, 20, \dots, 80\}$ . Based on model diagnostics and face validity checks, I use  $K = 50$  as the final model. I weight face validity higher than model diagnostics in the selection of  $K$ . A manual review of the top words shows that  $K = 50$  yields the most coherent and distinct topics, minimizing within-topic correlation and maximizing between-topic correlation.

### **Preprocessing**

Before estimation, I preprocessed and vectorized the corpus using a bag-of-words approach. Before vectorization, I removed all Danish stopwords as defined by the *quanteda* package in R (Benoit et al. 2018) and a set of corpus-specific stopwords such *ordfører* and *lovforslag* (“spokesperson” and “bill” in English, respectively). Afterwards, the corpus was tokenized to one-grams and subsequently converted to a document-feature matrix. I kept only tokens appearing in at least 0.01% of the documents (i.e. speeches) and at most in 2.5%. The upper limit is lower than the typical preprocessing of topic models, but model checks showed a significant decline in the semantic interpretation of the topics.

### **Labeling**

Upon estimation, I manually labeled each topic based on the topic keywords. I looked at both FREX, lift, and score to triangulate the labeling and managed to assign meaningful labels to 45 out of 50 topics (90%). This corresponds to 86.2% of the speeches. This includes topics such as “COVID-19,” “Gender and equality,” and “Transport regulation.”

**Table B1:** Topic Labels and Distributions

Topic No.	Label	Count	Share (%)
10	Agriculture and environment	9523	2.222%
9	Church	2709	0.632%
38	Consumer regulation	6227	1.453%
30	COVID-19	4678	1.091%
24	Crime	11785	2.749%
20	Culture	5351	1.248%
1	Danish Commonwealth	3472	0.810%
7	Deliberation	6271	1.463%
28	Democracy and free speech	4770	1.113%
18	Digitalization	6966	1.625%
2	Education	9811	2.289%
31	Elderly	7316	1.707%
8	Elections	6704	1.564%
16	Energy	13220	3.084%
43	EU	13846	3.230%
40	Finance Act	6021	1.405%
44	Finance and business	13164	3.071%
41	Foreign policy	5801	1.353%
25	Gender and equality	7571	1.766%
45	Healthcare	10416	2.430%
37	Housing	8995	2.098%
23	Immigration	8743	2.040%
39	International war	14312	3.339%

*Continued on next page*

<b>Topic No.</b>	<b>Category</b>	<b>Count</b>	<b>Share (%)</b>
22	Islam	8304	1.937%
27	Judicial system	4982	1.162%
5	Laws	13109	3.058%
50	LGBT	93	0.022%
12	Military	2716	0.634%
42	Municipalities	12297	2.869%
21	Nordic	1991	0.464%
32	Police	8411	1.962%
48	Procedural	13327	3.109%
17	Public transport	8570	1.999%
33	Refugees	8262	1.927%
36	Schools	11226	2.619%
47	Social benefits	14100	3.289%
6	Social policy	9562	2.231%
29	Taxes vs. welfare	27048	6.310%
46	Tobacco and alcohol	3483	0.813%
15	Transport regulation	4960	1.157%
13	Turkey and Erdogan	4673	1.090%
14	Unemployment	8157	1.903%
49	VAT and taxes	5253	1.225%
26	Welfare	2773	0.647%
34	Workers and wages	10043	2.343%
3	Unlabeled1	11765	2.745%
4	Unlabeled2	5922	1.382%
11	Unlabeled3	12708	2.965%

*Continued on next page*

<b>Topic No.</b>	<b>Category</b>	<b>Count</b>	<b>Share (%)</b>
19	Unlabeled4	11724	2.735%
35	Unlabeled5	15516	3.620%

### *C Validating Measures of Group Priorities*

The STM measure of group priorities is validated by comparing the classification to the CAP coding. Recall that I define women's issues as "gender and inequality" and lower social class issues as "workers and wages." When a legislator raises a group's issues in a speech, this should occur more often within agendas defined as a group's interests than in agendas not defined as a group's interests according to the CAP measure. This tests whether legislators happen to raise the group's issue more when it is on the agenda than when it is not. I analyze this by measuring how often a topic is dominant. A dominant topic is defined as the topic  $k$  having the largest weight  $\Omega_{n,k}$  for speech  $n$ , which is the topic occurring with the highest share.

For women, 24.5% of the speeches have women's issues as the dominant topic when an agenda is categorized as women's interests with the CAP codings. When the agenda is not categorized as women's interests, this amounts to 0.8% of the speeches. For class, 13.4% of the speeches have lower-class issues as the dominant topic when an agenda is categorized as class-related interest with the CAP codings. When this is not the case, the share is 1.5%. Both social groups echo the same pattern. This pattern is reassuring in two ways. First, it shows that the STM and CAP measures correlate, and second, they still capture distinct dimensions. In fact, the validation exercise shows that legislators indeed use speeches to frame policy issues in ways that align with their attitudes and preferences.

The measures can also be compared by looking at the speech-to-agenda link rather than the agenda-to-speech link. Of all speeches where women's issues are classified as the dominant topic (i.e. "gender and family"), 64.3% is given in agendas defined as women's issues with CAP. This share is 35.9% for the lower educated. This pattern follows the same lines as the first validation exercise, echoing that legislators have substantial leverage to frame policy debates in favor their group priorities.

*D Regression Tables*

	Gender		Social class	
	STM	CAP	STM	CAP
Intercept	-5.348*	-4.818*	-4.459*	-3.685*
	(0.108)	(0.143)	(0.073)	(0.113)
Group representative	1.473*	1.438*	0.160	0.288
	(0.156)	(0.207)	(0.185)	(0.276)
Random intercepts (legislator)	✓	✓	✓	✓
AIC	50499.735	50716.897	62291.271	68052.815
BIC	50531.390	50746.560	62322.926	68082.478
Log likelihood	-25246.868	-25355.448	-31142.636	-34023.408
N	282573	145467	282573	145467
N(Legislators)	383	381	383	381
Var: Legislators (Intercepts)	2.034	3.285	1.399	3.408

*Note: \*p < 0.05 with robust standard errors in parentheses. Estimates are from logistic multi-level regression models. Random intercepts included at the level of each legislator. The outcome is whether a speech (STM) or an agenda (CAP) is about a group's issue.*

**Table D1:** Regression Table for Hypothesis 1.



	Gender				Social class			
	STM	CAP	STM	CAP	STM	CAP	STM	CAP
Woman representative	-0.008 (0.004)		0.031* (0.006)					
Women's issue	0.052* (0.021)	0.059* (0.022)	0.035 (0.018)	0.066* (0.019)				
Women's issue × Woman representative	0.087* (0.027)	0.092* (0.027)	-0.016 (0.025)	-0.019 (0.025)				
-----								
Class representative					-0.011 (0.006)		-0.045* (0.008)	
Social class issue					-0.062* (0.013)	-0.067* (0.013)	0.073* (0.011)	0.101* (0.012)
Social class issue × Class representative					0.183* (0.026)	0.197* (0.027)	0.048* (0.022)	0.052* (0.026)
Legislator FE	✗	✓	✗	✓	✗	✓	✗	✓
N	282573	282573	145467	145467	282573	282573	145467	145467
R <sup>2</sup>	0.000	0.005	0.000	0.030	0.000	0.005	0.001	0.030
Adj. R <sup>2</sup>	0.000	0.004	0.000	0.027	0.000	0.003	0.001	0.028

Note: \* $p < 0.05$  with robust standard errors in parentheses. Estimates are from regression models with and without legislator fixed effects. The outcome is z-standardized vocal pitch. Predictors are whether a speech (STM) or an agenda (CAP) is about a group's issue, whether the legislator is a descriptive representative of women and lower social classes, and their interaction.

**Table D2:** Regression Table for Hypothesis 2.

	Gender									
	STM (standardized)					CAP (binary)				
Year 1	-0.002 (0.022)	-0.003 (0.022)	0.006 (0.022)	-0.003 (0.022)	0.013 (0.022)	0.035* (0.006)	0.035* (0.006)	0.028* (0.006)	0.035* (0.006)	0.031* (0.006)
Year 5	-0.091* (0.023)	-0.089* (0.023)	-0.043 (0.024)	-0.089* (0.023)	-0.009 (0.029)	0.022* (0.006)	0.021* (0.006)	0.030* (0.007)	0.021* (0.006)	0.073* (0.009)
Year 10	-0.066* (0.024)	-0.062* (0.025)	-0.059* (0.026)	-0.062* (0.025)	-0.034 (0.040)	0.003 (0.008)	-0.002 (0.008)	-0.020* (0.009)	-0.002 (0.008)	0.079* (0.017)
Year 15	-0.196* (0.024)	-0.188* (0.024)	-0.209* (0.028)	-0.188* (0.024)	-0.131* (0.058)	-0.027* (0.007)	-0.027* (0.007)	-0.097* (0.011)	-0.027* (0.007)	0.072* (0.024)
Year 20	-0.227* (0.028)	-0.215* (0.028)	-0.278* (0.033)	-0.215* (0.028)	-0.189* (0.076)	0.017 (0.018)	0.014 (0.018)	-0.036 (0.018)	0.014 (0.018)	0.190* (0.034)
Govt. membership		-0.036* (0.007)	-0.038* (0.009)	-0.036* (0.007)	-0.037* (0.009)		0.004 (0.003)	-0.001 (0.003)	0.004 (0.003)	-0.010* (0.004)
Election year		0.016 (0.010)	-0.015 (0.010)	0.016 (0.010)	-0.005 (0.012)		0.021* (0.004)	0.021* (0.004)	0.021* (0.004)	0.020* (0.005)
Covariates	✗	✓	✓	✓	✓	✗	✓	✓	✓	✓
Fixed effects: Legislator	✗	✗	✓	✗	✓	✗	✗	✓	✗	✓
Fixed effects: Election term	✗	✗	✗	✓	✓	✗	✗	✗	✓	✓
N	102001	102001	102001	102001	102001	51767	51767	51767	51767	51767
R <sup>2</sup>	0.005	0.005	0.075	0.005	0.076	0.006	0.006	0.095	0.006	0.103
Adj. R <sup>2</sup>	0.004	0.005	0.073	0.005	0.075	0.005	0.006	0.092	0.006	0.100

Note: \*  $p < 0.05$  with robust standard errors in parentheses. Estimates are from regression models with and without covariates, legislator fixed effects, and election term fixed effects. The outcome is whether a speech (STM) or an agenda (CAP) is about a group's issue.

**Table D3:** Regression Table for Hypothesis 3 (Gender). Estimates for years 6–9, 11–14, and 16–19 are excluded for visualization purposes.

	Gender									
	STM (standardized)					CAP (binary)				
Seniority (in years)	-0.011*	-0.010*	-0.012*	-0.010*	-0.011*	-0.002*	-0.002*	-0.004*	-0.002*	0.007*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Govt. membership		-0.038*	-0.037*	-0.038*	-0.037*		0.005*	-0.002	0.005*	-0.009*
		(0.006)	(0.008)	(0.006)	(0.009)		(0.003)	(0.003)	(0.003)	(0.004)
Election year		0.006	-0.016	0.006	-0.001		0.030*	0.030*	0.030*	0.029*
		(0.010)	(0.010)	(0.010)	(0.011)		(0.004)	(0.004)	(0.004)	(0.005)
Covariates	✗	✓	✓	✓	✓	✗	✓	✓	✓	✓
Fixed effects: Legislator	✗	✗	✓	✗	✓	✗	✗	✓	✗	✓
Fixed effects: Election term	✗	✗	✗	✓	✓	✗	✗	✗	✓	✓
N	102001	102001	102001	102001	102001	51767	51767	51767	51767	51767
R <sup>2</sup>	0.003	0.003	0.074	0.003	0.076	0.002	0.003	0.091	0.003	0.099
Adj. R <sup>2</sup>	0.003	0.003	0.073	0.003	0.074	0.002	0.003	0.088	0.003	0.096

Note: \*  $p < 0.05$  with robust standard errors in parentheses. Estimates are from regression models with and without covariates, legislator fixed effects, and election term fixed effects. The outcome is whether a speech (STM) or agenda (CAP) is about a group's issue. Seniority is measured in years is modeled as a linear functional form.

**Table D4:** Regression Table for Hypothesis 3 (Gender). Linear Specification of Seniority.

	Social class									
	STM (standardized)					CAP (binary)				
Year 1	-0.110*	-0.108*	-0.069*	-0.108*	-0.061*	0.006	0.007	0.010	0.007	0.009
	(0.034)	(0.034)	(0.031)	(0.034)	(0.031)	(0.014)	(0.014)	(0.013)	(0.014)	(0.013)
Year 5	-0.026	0.013	-0.027	0.013	-0.024	0.003	0.009	0.002	0.009	0.015
	(0.037)	(0.037)	(0.034)	(0.037)	(0.042)	(0.015)	(0.015)	(0.014)	(0.015)	(0.017)
Year 10	-0.007	-0.008	-0.250*	-0.008	-0.234*	0.005	0.027	-0.099*	0.027	-0.074*
	(0.038)	(0.039)	(0.040)	(0.039)	(0.070)	(0.016)	(0.016)	(0.017)	(0.016)	(0.030)
Year 15	-0.183*	-0.151*	-0.422*	-0.151*	-0.406*	0.067*	0.066*	-0.103*	0.066*	-0.059
	(0.037)	(0.037)	(0.041)	(0.037)	(0.101)	(0.019)	(0.019)	(0.019)	(0.019)	(0.044)
Year 20	-0.066	-0.055	-0.569*	-0.055	-0.565*	-0.060*	0.001	-0.178*	0.001	-0.118*
	(0.054)	(0.054)	(0.058)	(0.054)	(0.136)	(0.022)	(0.022)	(0.025)	(0.022)	(0.057)
Govt. membership		-0.209*	-0.134*	-0.209*	-0.103*		0.015*	-0.046*	0.015*	-0.045*
		(0.010)	(0.012)	(0.010)	(0.012)		(0.005)	(0.007)	(0.005)	(0.007)
Election year		-0.069*	0.028*	-0.069*	0.054*		-0.091*	-0.024*	-0.091*	-0.030*
		(0.014)	(0.014)	(0.014)	(0.018)		(0.006)	(0.006)	(0.006)	(0.007)
Covariates	✗	✓	✓	✓	✓	✗	✓	✓	✓	✓
Fixed effects: Legislator	✗	✗	✓	✗	✓	✗	✗	✓	✗	✓
Fixed effects: Election term	✗	✗	✗	✓	✓	✗	✗	✗	✓	✓
N	37063	37063	37063	37063	37063	21314	21314	21314	21314	21314
R <sup>2</sup>	0.007	0.016	0.125	0.016	0.129	0.014	0.020	0.323	0.020	0.324
Adj. R <sup>2</sup>	0.006	0.016	0.123	0.016	0.127	0.013	0.019	0.321	0.019	0.321

Note: \*  $p < 0.05$  with robust standard errors in parentheses. Estimates are from regression models with and without covariates, legislator fixed effects, and election term fixed effects. The outcome is whether a speech (STM) or an agenda (CAP) is about a group's issue.

**Table D5:** Regression Table for Hypothesis 3 (Social Class).

	Social class									
	STM (standardized)					CAP (binary)				
Seniority (in years)	0.006*	0.006*	-0.024*	0.006*	-0.026*	0.002*	0.002*	-0.008*	0.002*	-0.003
	(0.001)	(0.001)	(0.002)	(0.001)	(0.006)	(0.000)	(0.000)	(0.001)	(0.000)	(0.003)
Govt. membership		-0.210*	-0.120*	-0.210*	-0.091*		0.004	-0.046*	0.004	-0.045*
		(0.009)	(0.011)	(0.009)	(0.011)		(0.005)	(0.007)	(0.005)	(0.007)
Election year		-0.064*	0.033*	-0.064*	0.068*		-0.092*	-0.024*	-0.092*	-0.036*
		(0.014)	(0.014)	(0.014)	(0.017)		(0.006)	(0.005)	(0.006)	(0.007)
Covariates	✗	✓	✓	✓	✓	✗	✓	✓	✓	✓
Fixed effects: Legislator	✗	✗	✓	✗	✓	✗	✗	✓	✗	✓
Fixed effects: Election term	✗	✗	✗	✓	✓	✗	✗	✗	✓	✓
N	37063	37063	37063	37063	37063	21314	21314	21314	21314	21314
R <sup>2</sup>	0.001	0.011	0.122	0.011	0.126	0.001	0.008	0.319	0.008	0.320
Adj. R <sup>2</sup>	0.001	0.011	0.121	0.011	0.124	0.001	0.008	0.317	0.008	0.318

Note: \* $p < 0.05$  with robust standard errors in parentheses. Estimates are from regression models with and without covariates, legislator fixed effects, and election term fixed effects. The outcome is whether a speech (STM) or an agenda (CAP) is about a group's issue. Seniority is measured in years and is modeled as a linear functional form.

**Table D6:** Regression Table for Hypothesis 3 (Social Class). Linear Specification of Seniority.

	Gender									
	STM (standardized)					CAP (binary)				
Women's issue	0.055*	0.055*	0.023*	0.055*	0.026*	0.441*	0.444*	0.181*	0.444*	0.217*
	(0.012)	(0.012)	(0.011)	(0.012)	(0.011)	(0.074)	(0.074)	(0.068)	(0.074)	(0.069)
Year 1	-0.024	-0.025	0.033	-0.025	0.029	-0.069*	-0.069*	-0.057*	-0.069*	-0.067*
	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.023)	(0.023)	(0.022)	(0.023)	(0.022)
Year 5	-0.243*	-0.238*	-0.346*	-0.238*	-0.313*	-0.307*	-0.303*	-0.431*	-0.303*	-0.382*
	(0.019)	(0.019)	(0.020)	(0.019)	(0.025)	(0.025)	(0.025)	(0.026)	(0.025)	(0.035)
Year 10	-0.489*	-0.479*	-0.823*	-0.479*	-0.783*	-0.461*	-0.450*	-0.831*	-0.450*	-0.859*
	(0.021)	(0.021)	(0.022)	(0.021)	(0.039)	(0.034)	(0.034)	(0.037)	(0.034)	(0.065)
Year 15	-0.412*	-0.405*	-1.131*	-0.405*	-1.145*	-0.380*	-0.384*	-1.008*	-0.384*	-1.155*
	(0.024)	(0.024)	(0.027)	(0.024)	(0.063)	(0.034)	(0.034)	(0.043)	(0.034)	(0.098)
Year 20	-0.710*	-0.697*	-1.420*	-0.697*	-1.472*	-0.665*	-0.659*	-1.385*	-0.659*	-1.685*
	(0.032)	(0.032)	(0.035)	(0.032)	(0.081)	(0.063)	(0.063)	(0.070)	(0.063)	(0.134)
Women's issue × Year 1	-0.039*	-0.039*	-0.010	-0.039*	-0.011	-0.442*	-0.445*	-0.152	-0.445*	-0.172*
	(0.014)	(0.014)	(0.013)	(0.014)	(0.014)	(0.083)	(0.083)	(0.078)	(0.083)	(0.079)
Women's issue × Year 5	-0.026	-0.026	-0.006	-0.026	-0.015	-0.272*	-0.269*	-0.004	-0.269*	-0.059
	(0.017)	(0.017)	(0.016)	(0.017)	(0.016)	(0.096)	(0.096)	(0.088)	(0.096)	(0.089)
Women's issue × Year 10	-0.021	-0.022	0.027	-0.022	0.017	-0.437*	-0.436*	-0.187	-0.436*	-0.200
	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.130)	(0.131)	(0.125)	(0.131)	(0.128)
Women's issue × Year 15	-0.035	-0.033	0.001	-0.033	-0.001	-0.661*	-0.670*	-0.391*	-0.670*	-0.416*
	(0.025)	(0.025)	(0.027)	(0.025)	(0.027)	(0.154)	(0.154)	(0.152)	(0.154)	(0.152)
Women's issue × Year 20	0.001	0.004	0.060	0.004	0.049	-0.597*	-0.607*	-0.494*	-0.607*	-0.535*
	(0.039)	(0.040)	(0.049)	(0.040)	(0.049)	(0.199)	(0.199)	(0.205)	(0.199)	(0.198)
Govt. membership		-0.030*	-0.203*	-0.030*	-0.180*		0.028*	-0.088*	0.028*	-0.069*
		(0.007)	(0.008)	(0.007)	(0.009)		(0.009)	(0.012)	(0.009)	(0.013)
Election year		-0.028*	-0.080*	-0.028*	-0.062*		-0.092*	-0.105*	-0.092*	-0.102*
		(0.010)	(0.010)	(0.010)	(0.012)		(0.015)	(0.015)	(0.015)	(0.017)
Covariates	✗	✓	✓	✓	✓	✗	✓	✓	✓	✓
Fixed effects: Legislator	✗	✗	✓	✗	✓	✗	✗	✓	✗	✓
Fixed effects: Election term	✗	✗	✗	✓	✓	✗	✗	✗	✓	✓
N	102001	102001	102001	102001	102001	51767	51767	51767	51767	51767
R <sup>2</sup>	0.032	0.032	0.081	0.032	0.088	0.033	0.034	0.088	0.034	0.096
Adj. R <sup>2</sup>	0.032	0.032	0.079	0.032	0.087	0.032	0.033	0.084	0.033	0.093

Note: \*  $p < 0.05$  with robust standard errors in parentheses. Estimates are from regression models with and without covariates, legislator fixed effects, and election term fixed effects. The outcome is z-standardized vocal pitch.

**Table D7:** Regression Table for Hypothesis 4 (Gender).

	Gender									
	STM (standardized)					CAP (binary)				
Women's issue	0.027*	0.027*	0.016*	0.027*	0.018*	0.041	0.044	0.045	0.044	0.053*
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)
Seniority (in years)	-0.029*	-0.027*	-0.079*	-0.027*	-0.094*	-0.022*	-0.022*	-0.072*	-0.022*	-0.102*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	(0.001)	(0.001)	(0.002)	(0.001)	(0.005)
Women's issue × Seniority (in years)	-0.001	-0.001	0.001	-0.001	0.001	-0.007*	-0.006	-0.005	-0.006	-0.003
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Govt. membership		-0.036*	-0.206*	-0.036*	-0.182*		0.019*	-0.093*	0.019*	-0.084*
		(0.007)	(0.008)	(0.007)	(0.009)		(0.009)	(0.012)	(0.009)	(0.013)
Election year		-0.077*	-0.106*	-0.077*	-0.056*		-0.152*	-0.139*	-0.152*	-0.094*
		(0.010)	(0.010)	(0.010)	(0.011)		(0.014)	(0.014)	(0.014)	(0.016)
Covariates	✗	✓	✓	✓	✓	✗	✓	✓	✓	✓
Fixed effects: Legislator	✗	✗	✓	✗	✓	✗	✗	✓	✗	✓
Fixed effects: Election term	✗	✗	✗	✓	✓	✗	✗	✗	✓	✓
N	102001	102001	102001	102001	102001	51767	51767	51767	51767	51767
R <sup>2</sup>	0.022	0.023	0.077	0.023	0.086	0.013	0.015	0.078	0.015	0.089
Adj. R <sup>2</sup>	0.022	0.023	0.075	0.023	0.084	0.013	0.015	0.075	0.015	0.086

Note: \* $p < 0.05$  with robust standard errors in parentheses. Estimates are from regression models with and without covariates, legislator fixed effects, and election term fixed effects. The outcome is z-standardized vocal pitch.

**Table D8:** Regression Table for Hypothesis 4 (Gender). Linear Specification of Seniority.

	Social class									
	STM (standardized)					CAP (binary)				
Social class issue	-0.060*	-0.062*	-0.084*	-0.062*	-0.093*	-0.227*	-0.228*	-0.217*	-0.228*	-0.221*
	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.086)	(0.085)	(0.085)	(0.085)	(0.084)
Year 1	0.066*	0.066*	0.079*	0.066*	0.073*	-0.041	-0.042	-0.048	-0.042	-0.045
	(0.033)	(0.033)	(0.033)	(0.033)	(0.033)	(0.043)	(0.043)	(0.043)	(0.043)	(0.043)
Year 5	-0.147*	-0.121*	-0.165*	-0.121*	-0.258*	-0.310*	-0.294*	-0.361*	-0.294*	-0.516*
	(0.034)	(0.034)	(0.035)	(0.034)	(0.044)	(0.046)	(0.046)	(0.048)	(0.046)	(0.061)
Year 10	-0.249*	-0.234*	-0.477*	-0.234*	-0.610*	-0.206*	-0.171*	-0.380*	-0.171*	-0.728*
	(0.035)	(0.035)	(0.038)	(0.035)	(0.071)	(0.050)	(0.050)	(0.055)	(0.050)	(0.108)
Year 15	-0.381*	-0.366*	-0.676*	-0.366*	-0.933*	-0.441*	-0.425*	-0.593*	-0.425*	-1.219*
	(0.039)	(0.039)	(0.043)	(0.039)	(0.102)	(0.053)	(0.053)	(0.059)	(0.053)	(0.151)
Year 20	-0.283*	-0.248*	-0.751*	-0.248*	-1.131*	-0.199*	-0.080	-0.409*	-0.080	-1.432*
	(0.056)	(0.057)	(0.059)	(0.057)	(0.135)	(0.080)	(0.082)	(0.095)	(0.082)	(0.204)
Social class issue × Year 1	0.103*	0.102*	0.103*	0.102*	0.098*	0.182	0.187	0.152	0.187	0.112
	(0.027)	(0.026)	(0.026)	(0.026)	(0.026)	(0.102)	(0.101)	(0.099)	(0.101)	(0.098)
Social class issue × Year 5	0.119*	0.115*	0.117*	0.115*	0.142*	0.420*	0.418*	0.366*	0.418*	0.391*
	(0.026)	(0.025)	(0.025)	(0.025)	(0.025)	(0.111)	(0.111)	(0.111)	(0.111)	(0.111)
Social class issue × Year 10	0.173*	0.167*	0.206*	0.167*	0.203*	0.336*	0.309*	0.324*	0.309*	0.229*
	(0.029)	(0.029)	(0.028)	(0.029)	(0.029)	(0.118)	(0.117)	(0.119)	(0.117)	(0.116)
Social class issue × Year 15	0.025	0.023	0.075	0.023	0.112*	0.036	0.012	-0.036	0.012	0.043
	(0.041)	(0.041)	(0.040)	(0.041)	(0.040)	(0.116)	(0.116)	(0.118)	(0.116)	(0.115)
Social class issue × Year 20	-0.049	-0.061	-0.024	-0.061	-0.009	0.250	0.135	0.199	0.135	0.221
	(0.047)	(0.048)	(0.042)	(0.048)	(0.041)	(0.229)	(0.226)	(0.234)	(0.226)	(0.234)
Govt. membership		-0.100*	-0.209*	-0.100*	-0.225*		-0.115*	-0.205*	-0.115*	-0.189*
		(0.011)	(0.016)	(0.011)	(0.017)		(0.015)	(0.022)	(0.015)	(0.023)
Election year		-0.120*	-0.149*	-0.120*	-0.078*		-0.165*	-0.172*	-0.165*	-0.079*
		(0.015)	(0.016)	(0.015)	(0.019)		(0.022)	(0.023)	(0.022)	(0.026)
Covariates	✗	✓	✓	✓	✓	✗	✓	✓	✓	✓
Fixed effects: Legislator	✗	✗	✓	✗	✓	✗	✗	✓	✗	✓
Fixed effects: Election term	✗	✗	✗	✓	✓	✗	✗	✗	✓	✓
N	37063	37063	37063	37063	37063	21314	21314	21314	21314	21314
R <sup>2</sup>	0.024	0.027	0.048	0.027	0.059	0.037	0.042	0.062	0.042	0.074
Adj. R <sup>2</sup>	0.023	0.026	0.046	0.026	0.056	0.035	0.040	0.057	0.040	0.069

Note: \* $p < 0.05$  with robust standard errors in parentheses. Estimates are from regression models with and without covariates, legislator fixed effects, and election term fixed effects. The outcome is z-standardized vocal pitch.

**Table D9:** Regression Table for Hypothesis 4 (Social Class).



	Social class									
	STM (standardized)					CAP (binary)				
Social class issue	0.053*	0.048*	0.021*	0.048*	0.016	0.195*	0.185*	0.127*	0.185*	0.114*
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.033)	(0.033)	(0.037)	(0.033)	(0.036)
Seniority (in years)	-0.014*	-0.013*	-0.040*	-0.013*	-0.067*	-0.007*	-0.005*	-0.029*	-0.005*	-0.077*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.006)	(0.001)	(0.001)	(0.002)	(0.001)	(0.009)
Social class issue × Seniority (in years)	-0.002*	-0.002*	0.000	-0.002*	0.001	-0.010*	-0.011*	-0.003	-0.011*	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Govt. membership		-0.131*	-0.245*	-0.131*	-0.262*		-0.126*	-0.239*	-0.126*	-0.239*
		(0.011)	(0.015)	(0.011)	(0.016)		(0.015)	(0.021)	(0.015)	(0.022)
Election year		-0.147*	-0.163*	-0.147*	-0.069*		-0.218*	-0.213*	-0.218*	-0.112*
		(0.015)	(0.015)	(0.015)	(0.018)		(0.020)	(0.021)	(0.020)	(0.025)
Covariates	✗	✓	✓	✓	✓	✗	✓	✓	✓	✓
Fixed effects: Legislator	✗	✗	✓	✗	✓	✗	✗	✓	✗	✓
Fixed effects: Election term	✗	✗	✗	✓	✓	✗	✗	✗	✓	✓
N	37063	37063	37063	37063	37063	21314	21314	21314	21314	21314
R <sup>2</sup>	0.007	0.013	0.038	0.013	0.049	0.002	0.012	0.034	0.012	0.051
Adj. R <sup>2</sup>	0.007	0.013	0.036	0.013	0.047	0.002	0.011	0.031	0.011	0.048

Note: \*p < 0.05 with robust standard errors in parentheses. Estimates are from regression models with and without covariates, legislator fixed effects, and election term fixed effects.

The outcome is z-standardized vocal pitch.

**Table D10:** Regression Table for Hypothesis 4 (Social Class). Linear Specification of Seniority.

## *E Pitch and Intrinsic Motivations*

The argument proposed by [Dietrich et al. \(2019\)](#) rests on a physiological model of the pitch where changes are said to arise because of exogenous changes to a speaker's emotional state. If so, this suggests that pitch can be used as a window into the minds of politicians, cutting through their strategic calculations. While this might be true, [Knox and Lucas \(2021\)](#) note that strategic considerations cannot be ruled out. Virtually all research on vocal expressions of emotions rely on trained actors ([Scherer et al. 2003](#)). This makes it logically impossible that pitch is entirely beyond the control of speakers ([Knox and Lucas 2021](#), p. 651). This has important implications for the scope of the pitch being an “honest” and “intrinsic” indicator of a politician's commitments. Still, it provides significant steps forward in disentangling the micro-foundations of the descriptive-to-substantive representation link – at least under the right circumstances.

Despite politicians being trained speakers, the primary source of variation in their vocal pitch is likely dependent on the context. On the campaign trail where small changes in delivery matter (see, for example, [Boussalis et al. 2021](#); [Damann et al. 2023](#)), the vocal style is probably more deliberate and more strategic than the style used in the average speech given in the average parliamentary debate. While [Rask and Hjorth \(2024\)](#) find evidence consistent with a strategic account of vocal style in parliamentary debates, this is mostly the case when the electoral and policy stakes are high. Put differently, when the electoral incentives and policy conflict are low, the source of variation is arguably less strategic. From other work, we know that politicians generally use more emotional rhetoric in parliamentary debates, carrying greater electoral incentives in the form of a larger audience ([Osnabrügge et al. 2021](#)), but also that TV broadcasting of legislative activities generally does not impact the average behavior of politicians ([Nieminen et al. 2023](#)). Together, this suggests that politicians communicate strategically when the stakes are high and less so in their general legislative work. As such, averaging pitch across multiple speeches in multiple legislative debates likely weakens the impact of strategic and extrinsic considerations.