Better to be Jeered than Ignored? Gender and Reactions during Parliamentary Debates

Elliott Ash, Johann Krümmel, Jonathan B. Slapin*

May 9, 2023

Word Count: 9,683

Abstract

Are non-verbal reactions during parliamentary debate gendered? Do male and female Members of Parliament (MPs) experience applause or jeering differently? In short, yes, and the gendered nature of a speech matters. Using an original corpus of over 544,000 speeches given in German state parliaments, we first estimate the gendered nature of parliamentary speeches, then examine how reactions to speeches given by male and female MPs differ. Female and male MPs receive similarly positive and negative reactions to their speeches on average, but they receive different reactions depending on the gendered nature of the speeches. Speeches using language associated with women's topics receive fewer reactions overall, and even fewer when delivered by men. The gendered nature of parliamentary interjections could affect how women MPs view their position and how women voters view parliament.

---

*Ash: ETH Zürich, ashe@ethz.ch; Krümmel: Independent Researcher, johann.kruemmel@outlook.de; Slapin (corresponding author): University of Zurich, slapin@ipz.uzh.ch. We thank Fabian Aiofi, Anton Boltachka, Rodrigo González and Jennifer Roberts for their helpful research assistance. Many individuals provided helpful comments on the earlier versions, including participants at workshops at the University of Lisbon and the LMU Munich and panel participants at the 7th Conference of the ECPR Standing Group on Parliaments.

1 Introduction

Parliamentary politics often involves a bit of theater. During debates, Members of Parliament (MPs) may interrupt, jeer, or applaud the speaker. Although scholars of legislative behavior have increasingly turned to parliamentary debate to learn about both intra- and inter-party competition — examining participation (Fernandes, Debus and Bäck, 2021; Proksch and Slapin, 2015), policy-positioning (Bäck and Debus, 2016; Proksch and Slapin, 2010), sentiment (Valentim and Widmann, 2021), and even tone of voice (Dietrich, Hayes and O'Brien, 2019) — they have paid less attention to the non-verbal features of debate (but see Imre et al., 2022; Miller and Sutherland, 2022). Interactions, such as interruptions and applause, can set the tone within the chamber, making the parliament a more hostile or welcoming environment.

MPs may experience this environment differently depending on their gender. The literature on women in parliament has shown that female MPs face a range of disadvantages. They are promoted less frequently to high-profile government positions (Goddard, 2019; O'Brien, 2015), participate less during debates (Bäck, Debus and Müller, 2014; Bäck and Debus, 2019), have higher levels of perceived stress (Erikson and Josefsson, 2019), and experience more sexual harassment than their male colleagues (Collier and Raney, 2018). This happens against the backdrop of a persistent under-representation of women in almost all national legislatures (Paxton, Hughes and Painter, 2010; Tripp and Kang, 2008).

Accordingly, women may also experience informal reactions to speech, e.g., interjections and applause, differently than men. Women's experience of these reactions may affect their perceptions of hostility, potentially impacting their decisions to participate in parliamentary politics or even run for office. But few studies to date examine the gendered nature of these behaviors, at least through the quantitative analysis of parliamentary transcripts (but see Miller and Sutherland, 2022).

This paper analyzes informal reactions to speeches in all 16 German state parliaments over an almost 30 year period from 1991 to 2020. We develop a new parliamentary speech corpus by collecting and parsing original parliamentary transcripts. In total, the data encompass 544,034 speeches and represent, to the best of our knowledge, the most comprehensive corpus of subnational legislative debates for any country in the world. We also have collected additional data on MPs' background and individual characteristics from official sources. Our corpus offers a rich new source of data that can be used to study any number of questions with respect to parliamentary behavior. Smaller corpora of German state parliamentary debate have already been used to understand parliamentary debate (see Valentim and Widmann, 2021), and the gendered nature of debate, in particular (Kroeber, 2022).

State parliaments in general, and German state parliaments in particular, offer unique advantages in that they hold several factors constant (e.g., basic political culture, party system, and language) while offering variation on other important variables, most notably the number of women in parliament, but also electoral rules and the strength of individual parties. Most importantly, these transcripts systematically record reactions of the audience during speeches. We can, therefore, systematically analyze the influence of gender on the informal reactions to speeches.

Theoretically, we rely primarily, but not solely, on role congruity theory (RCT) (Eagly and Karau, 2002). RCT implies that individual representatives react more negatively to speeches that do not conform to their preconceived gender stereotypes (see Bäck and Debus, 2020). We develop a measure of gender congruity based on the association of speech topics with gender. Speech topics are determined using a latent Dirichlet allocation (LDA) topic model (Blei, 2003), and role congruity is modeled as a function of global associations between topics and gender. We then regress the frequency of different types of reactions on our measures of role congruity to assess the relationship between congruity and the nature of reaction.

Our results are surprising. We find gendered patterns of speech and interruptions, but not those found in existing research. Contrary to findings that women MPs are subject to more negative interruptions than men (Miller and Sutherland, 2022), we discover that speeches given by women are more likely to receive positive reactions and less likely to receive negative reactions. However, speeches using language associated with women's topics receive far fewer reactions of any kind. This is primarily driven by the fact that men speaking on women's topics receive little response. In contrast, men speaking on male topics draw both more positive (e.g., applause) and more negative (e.g., interjection) reactions than women speaking on the same topics. Positive reactions towards women speakers are quite steady regardless of the gendered nature of a speech's topic. These findings suggest that, rather than outright hostility, women — and indeed any MP — speaking on topics associated with women may face more ambivalence or disregard than when talking on topics associated with men. Simply put, language focused on women's topics is more often ignored, while the language of male topics receives more engagement, especially when used by male MPs.

2 Background

2.1 Parliamentary Reactions and Parliaments as Gendered Institutions

Existing literature focuses primarily on formal debate participation. It views parliamentary speech-making as a tool for position-taking used by MPs and their parties (Bäck and Debus, 2016; Herzog and Benoit, 2015; Proksch and Slapin, 2012, 2015). While debate participation is subject to formal rules, reactions to speeches are more likely governed by informal norms and codes of conduct. Official rules of procedure often ban only the most egregious cases of heckling and name-calling. Because reactions are subject to little control, and are often not reported on, we can understand them as a reflection of informal parliamentary culture (Dörner and Vogt, 2011). Despite wide-ranging literature on informal institutions (Azari and Smith, 2012; Helmke and Levitsky, 2004), less research examines the informal norms surrounding parliamentary participation. However, literature on gender in parliament tends to find that informal institutions often place women at a disadvantage (Colley and Acker, 2020; Waylen, 2014).

Due to the history of parliaments as predominantly male organizations (Mackay, Kenny and Chappell, 2010) and the gendered nature of society (Acker, 1990), all aspects of parliamentary activity are to some degree subject to gendered norms and rules (see Schwindt-Bayer, 2010; Barnes, 2016). Many female representatives have reported unease with an overly adversarial debate culture in parliament (Collier and Raney, 2018). There is also what Chappell (2006) calls the “logic of appropriateness”, which defines gender-specific norms for behavior. Chappell suggests that within parliament there are certain types of behavior that are appropriate for one gender but not for the other. Boorish heckling, for example, may be expected, and therefore ignored, when male MPs engage in it, whereas female MPs engaging in similar behavior could expect criticism. A similar logic may explain why women have found it more difficult to gain leadership positions within parties and parliaments (see O’Brien, 2015).

Another consequence of gendered institutions is the segregation of issue areas by gender. When examining ministerial and cabinet appointments, women tend to be chosen for lower salience issue areas and in areas that are stereotypical for their gender (Krook and O’Brien, 2012; Goddard, 2019). Likewise, women tend to focus on different issues in parliamentary debates as well as other parliamentary activity (Catalano, 2009; Swers, 2013; Bäck and Debus, 2019; Lippmann, 2022). Informal institutions lead to gendered interactions, gendered divisions of labor, and general disadvantages for women resulting from informal processes.

Recent work has taken a qualitative, descriptive approach to the study of gender and its impact on parliamentary interjections. Examining the German federal parliament, Och (2020) analyzes gendered patterns of interruptions in three debates. While she finds that women are interrupted slightly more often during their speeches, she does not find evidence for malicious or sexist interruptions. In his historical analysis, Burkhardt (1992) shows that through the 1980s interjections were frequently used to question the status of women in parliament and to make sexist remarks.

To the best of our knowledge, only two studies assess reactions in parliament as a gendered phenomenon using large-N statistical analyses, one in the context of the U.S. Congress (Miller and Sutherland, 2022) and the second in the Ecuadorian Congress (Vera and Vidal, 2020).[1] Both studies focus solely on interruptions and find that they follow systematic and gendered patterns. Women are either interrupted more often, cut their speeches short to preemptively avoid interruption, or are interrupted more frequently when they use masculine language. In contrast to these studies, we study a range of reactions, both positive and negative in nature.

[1] A recent quantitative study examines applause in German and Austrian parliaments to analyze the mood within a coalition (Imre et al., 2022), but does not examine gender.

2.2 Theoretical Approaches to Gendered Reactions

Our theoretical approach centers primarily, but not solely, on role congruity theory (RCT) (Eagly and Karau, 2002), which suggests that individuals evaluate situations based on how they fit with preconceived, socially determined gender stereotypes. RCT is, itself, based on social role theory (Eagly, 1978), which explains behavioral gender differences as the consequence of stereotypes originating in socialization. Individuals are socialized into a society permeated by gendered divisions, which in turn offer cognitive models of gender (Acker, 1992). Social role theory commonly ascribes particular qualities to men and women. Female gender is associated with communal attributes and male gender with agentic attributes (Williams and Best, 1990). Agency is the tendency for self-advancement in social hierarchies while communion describes a tendency to form positive relationships with other people (Trapnell and Paulhus, 2012). Gender stereotypes follow these patterns of occupational segregation. There are more men in agentic roles than women, which leads people to internalize these associations as stereotypes (Sczesny, Nater and Eagly, 2019).

The ascribed social roles are not neutral expectations, but conflate a descriptive dimension with a prescriptive one and become implicit rules for behavior. An individual not only expects members of certain groups to act according to stereotypes but also evaluates them based on those expectations. Because a divergence between stereotypical expectations and reality can lead to negative judgment, gender stereotypes can lead to disadvantages for women in leadership, or agentic, positions. It could also potentially disadvantage men who take on roles associated with communal attributes.

Role congruity theory has significant implications for parliamentary politics. The role of MP is often conceptualized as male and, thus, associated with agentic attributes (Schneider and Bos, 2019), which in turn creates expectations about the agentic nature of MPs (Gervais and Hillard, 2011). These expectations put female MPs who do not assume agentic behavior associated with MPs at a disadvantage. At the same time, though, women are expected to engage in a communal manner, creating a dilemma, often referred to as the *double bind*. Female MPs must choose between their communal gender role on the one hand, and the role of an agentic MP on the other, with both choices potentially subject to negative judgment.

There are, however, many ways to fill the role of an MP and research finds that women speak more frequently during debates on topics that are congruent with their gender (Bäck and Debus, 2019; Lippmann, 2022; Piscopo, 2011; Schwindt-Bayer and Mishler, 2005; Swers, 2013). Policy areas such as family, welfare, education, and culture are much more strongly associated with female attributes than areas such as defense, finance, and foreign relations (see also Höhmann, 2020). Parliament thus offers a variety of roles to fill and evidence suggests that the gender of their occupants tends to correspond to associated agentic or communal attributes.

From our discussion of RCT, we first hypothesize that female MPs generally receive more negative reactions to their speeches as a consequence of a perceived incongruence between their gender and the role of the parliamentarian. This reflects the notion of a double bind in RCT — that women face negative reactions both for taking on the agentic role of MP and for behaving in a communal manner when fulfilling that supposedly agentic role.

Hypothesis 1 (H1): *Speeches by female MPs are associated with more negative reactions in parliament than those by male MPs.*

Building on the idea that certain language, topics and types of behavior are more congruent with one gender than the other, our second hypothesis is that gender-incongruent behavior — namely, speaking on topics associated with the other gender — leads to more negative reactions.

Hypothesis 2 (H2): *Gender-incongruent behavior is associated with negative reactions in parliament and gender-congruent behavior with positive reactions.*

Although RCT, from which we derive our primary hypotheses, suggests that women are likely to experience more negative reactions than men, there are also theoretical reasons to believe that they may not. Women may receive positive reactions when focusing on gender-congruent topics, or they may simply be ignored. Additionally, the presence of women in the chamber may impact men's behavior (Celis and Erzeel, 2015). And men's gendered behavior — indeed, that of any "critical actor" — requires examination as it may impact how female MPs are received in the chamber: whether the topics they discuss are perceived positively or negatively; whether they receive engagement; or whether they are simply ignored (Celis et al., 2008; Childs and Krook, 2006).

Höhmann (2020) presents three theoretical arguments to explain how women's presence in the parliamentary chamber could effect male MPs' behavior, particularly with respect to women's issues. First, he argues that women's presence could lead to spillover, whereby men become more likely to engage with women's issues as they become more prevalent in parliament. A spillover effect could lead to more engagement, both positive and negative, with topics raised by women as these topics become more commonplace, and as MPs treat them as they would male topics. Second, he posits that there may exist a group-threat effect — that men feel threatened as women and women's issues receive more attention. Such an effect would lead us to expect engagement through negative reactions. And finally, he argues that a substitution effect could exist where men pay less attention to women's issues as women pay more attention to them. As males outnumber females in parliaments, and women may also engage with male topics, this argument implies that women's issues simply receive less attention and are ignored. Examining parliamentary questions in the German Bundestag he finds the strongest evidence for the substitution hypothesis.

In the context of our study, these findings suggest that we need to examine the gendered nature of reactions to speeches given by both male and female MPs. They also suggest that men who speak using the language of women's issues may experience fewer reactions. If the substitution effect is strong, male MPs may not be expected to address these topics and they may not be listened to when they do. Rather than engagement, they experience silence.

Ultimately, we find strong evidence that patterns of reactions to parliamentary speech are highly gendered, however, we find little evidence for H1. If anything, speeches by women receive more positive reactions. There is support for H2, that gender congruence matters, but it seems to matter more for male than for female MPs, primarily because speeches on male topics receive far more reactions of all types. Moreover, men are less likely to receive reactions to their speeches when speaking using the language of female topics. This may offer further evidence for Höhmann's (2020) substitution hypothesis.

3 Data

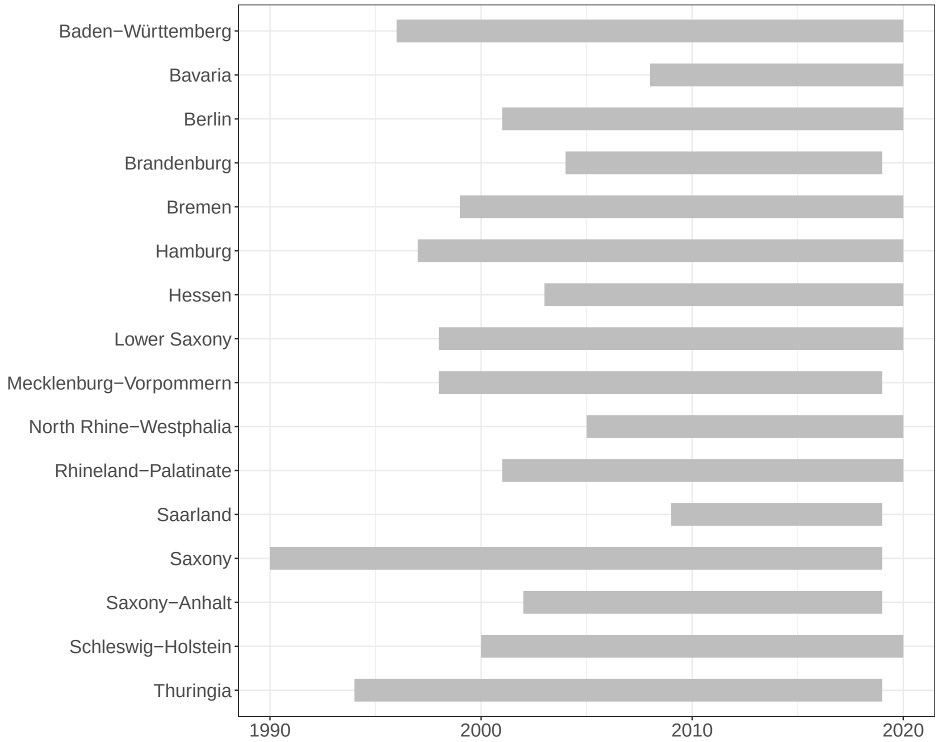
We have collected an original corpus of debate transcripts from all sixteen German state parliaments, with the earliest data starting in 1991 and the latest running through 2020. The corpus includes all speeches in parliament as well as the reactions to those speeches. In addition, we have assembled from online sources a comprehensive dataset of demographic details for all MPs who were part of parliaments in the corpus. The data we collect and make available here will be useful not only for studying gendered reactions, but also many other questions of parliamentary behavior.

German state parliaments provide a rich and under-utilized source of data for studying parliamentary behavior, although scholars are beginning to use state debate transcripts more frequently (see Kroeber, 2022; Valentim and Widmann, 2021). Within the German federal system, state parliaments and governments are quite powerful and have responsibility to make laws across a large number of areas. Recent research shows that governing parties at the regional level discuss similar issues to national parties in their coalition agreements and will often take positions on topics that are the purview of the federal government (Gross and Krauss, 2021). Moreover, state parliaments often play an important part in politicians' career progression, with national politicians often first making a name for themselves at the state level. To give a prominent example, Armin Laschet, the Christian Democratic Union's (CDU) candidate for chancellor in the 2021 federal election, spent almost his entire career in state politics in his home state of North Rhine-Westphalia.

State parliaments vary in several ways relevant to our analysis. First, they vary in their levels of women's representation in parliament. As of 2019, women's representation varied from a low of 24.5% in Baden-Württemberg to a high of 40.5% in Bremen.[2] Kroeber (2022) has shown that this variation may impact how male MPs discuss traditionally female topics. Second, parties differ in strength across states and states even differ in the electoral systems they use. We can control for important variation in key variables, while holding many other variables — culture, language, basic political system and understandings of politics — constant.

[2] Data available at bmfsfj.de/bmfsfj/service/online-rechner/gleichstellungsatlas?indikator=Mandate-Landesparlamente.

Figure 1: Available Parliamentary Periods by State



Notes. List of German states with bars indicating the years for which parliamentary debate transcripts are available and included in the corpus.

Third and most importantly, all states report extensive parliamentary debate transcripts and mark reactions, such as applause and jeers, in a comparable fashion. Such comparability would be difficult to replicate in a cross-country analysis, where parliamentary transcript formatting, not to mention parliamentary political culture, would vary much more widely.

3.1 Debate Transcripts

The corpus covers a total of 544,034 speeches over 74 parliamentary periods in sixteen states. Speeches are defined by the change of the official speaker. Whenever the MP who has the right to speak changes, a new speech begins. This implies that if a speech is frequently interrupted by the president or MPs asking questions, it will enter the data as multiple speeches separated by questions in between. Participation by the president of the assembly is excluded because it is a special case and not comparable with that of other speakers.

Figure 1 shows the data coverage by state and year. The variation across states is due to variation in the formatting and availability of speeches. The extraction of structured data from unstructured PDF documents was not trivial and necessitated parsing and cleaning. While the method used here produces high-quality results, parsing becomes too error prone when applied to transcripts that were not created using digital word processing. Therefore, the slow digitization of the administration in German state parliaments constituted a natural limit to this data collection. The parsing process and corpus collection is described in more detail in Appendix A.

Beyond the speech content, stenographers in German parliaments are highly consistent in how they note reactions in parliamentary transcripts. In multiple interviews, they describe how they systematically assign various interruptions to predefined categories.[3] We count the seven most important types of reactions as categorized by the stenographers. These can be subdivided into non-verbal and verbal reactions. The most frequent type of non-verbal reaction is *applause* (*Beifall*). It is universally acknowledged as a sign of support and it is customary to clap for speakers of one's own party. Less common are *cheerfulness* (*Heiterkeit*), which stenographers use for laughter with a positive connotation, and *laughter* (*Gelächter* or *Lachen*), which stenographers use for more malicious jeering. The most frequent type of verbal reaction is the *interjection* (*Zwischenruf* or *Zuruf*). If parliamentarians verbally protest against something or voice their agreement, this is noted respectively as *disagreement* (*Widerspruch*) or *agreement* (*Zustimmung*). A last category of informal participation is *unrest* (*Unruhe*), which describes a state of noisiness and disorder.

On average, there are 2.3 instances of applause per speech. Interjections occur on average 1.4 times per speech. All other types of reactions are rather rare. Importantly, all types of reactions are highly skewed and there are very few speeches that receive many reactions. Summary statistics on the frequency of different types of reaction, as well as the other variables we use in the analysis, are reported in Appendix D. While the transcripts record that a reaction has occurred, unfortunately they do not always note the source of the reaction, and almost never at the level of the individual. For example, we cannot know whether women are more likely to

[3] See, for example, https://www.sueddeutsche.de/projekte/artikel/politik/die-afd-im-bundestag-e362724/.

clap for women because, although we may sometimes know whether the applause is coming primarily from one party, we do not know which individuals are engaging in applause.

In the following analysis, we classify the following reactions as positive: applause, cheerfulness, and agreement; and the remaining as negative: interjection, laughter, disagreement, and unrest. Stenographers, themselves, define laughter as negative, and they use the term solely for derisive forms of laughter. For positive laughter, they use the term cheerfulness. Applause and agreement are clearly positive. Interjections tend to be a sign of disagreement, often come from opposing parties, and almost never from the party of the speaker. However, they are a central part of parliamentary culture in Germany (Burkhardt, 2013). They occur too frequently in German state parliaments to be interpreted as a personal attack, but they are sufficiently infrequent so as not to lose their relevance. Because in our setting the current speaker has the advantage of a microphone and amplification, small numbers of interjections do not meaningfully disrupt the speeches, but sustained interjections can. Therefore, interjections are less a transgressive attack on a political opponent and rather a strong expression of disagreement in a lively discussion. Nevertheless, because they tend to come from opposing parties, they can be malicious or interrupting in nature, and because the literature has treated such interruptions as generally negative (e.g., Miller and Sutherland, 2022), we do so as well. Appendix B further discusses how stenographers use these terms and provides examples of speeches, along with reactions, to offer validation of classifications as positive and negative.

3.2 MP Data

We supplement the transcript data with information from parliament websites (e.g., MP birth date).[4] The gender of the parliamentarians is not included in any official parliamentary website. Coding gender is problematic because, with many international names in the data, it is difficult to detect gender based solely on name. Even manual coding is not error-free when it comes to possibly unknown first names. To automate the process, gender coding was based on parsing the Wikipedia entries of all parliamentarians. Based on the assumption that Wikipedia articles

[4]MPs sometimes leave parliament before the end of a legislative period and are replaced by a new MP. The data do not differentiate between MPs who serve an entire term and those who do not. This is relevant for the share of women in parliament which is based on the entirety of MPs who served during the period.

contain more references to its designated topic than to other people, gender is assigned as a function of the word count of male and female pronouns. We manually check a sample of these pages and verify that having more female pronouns than male pronouns reliably predicts the actual gender of the parliamentarian.

The result of our efforts is a dataset of all MPs who were part of German state parliaments during the period under investigation. It includes party membership, the name of the MP, their birth date, and the parliamentary period and state.[5] As the information on party membership was collected from the transcripts, the central information taken from this dataset is the MP's gender and birth year. Approximately 32% of the more than 9,600 MPs in the dataset are women.

4 Methods

Our methodological approach consists, first, of an LDA topic model to learn gender-topic congruence, and second, of linear regressions to estimate a statistical effect of gender-incongruent statements on the prevalence of negative feedback.

4.1 Topic Model Approach to Measuring Role Congruity

Gender roles and MPs' congruity or incongruity with those roles are latent variables, which we measure from the text of parliamentary speeches. In contrast to research which hand-codes topics of debates according to gender stereotype (Bäck and Debus, 2019; Krook and O'Brien, 2012), we take a more data-driven approach. We apply a Latent Dirichlet Allocation (LDA) topic model (Blei, 2003) to the bag-of-words representations of each parliamentary speech.[6] Our approach differs from those that hand-code speeches in at least three ways. First, we estimate the topics based on the language within a speech, rather than at the level of debate. This means that a speech given during a state budget debate that a hand-coding approach might classify as belonging to a "budget" or "finance" category, could belong to other categories based on our approach. The LDA model may find that a budget speech that discusses spending money

[5]There are double entries if a parliamentarian was in parliament for more than one period.
[6]See also Lippmann (2022), who takes a similar approach.

on education and healthcare has more in common with speeches in an education or healthcare category than a finance or budget category. A second difference is that hand-coding approaches typically use mutually exclusive categories and assign a speech or debate to only one category. In an LDA model, a speech is conceived as a vector of topic shares, so that each speech belongs to multiple categories. Our budget debate speech on education and healthcare may, for example, consist of 40% education, 35% healthcare, and 25% finance and budget. Finally, whereas some speeches may be difficult to fit into pre-defined, mutually exclusive categories in a hand-coding approach, all speeches receive a score — namely a vector of topic proportions — using our approach, meaning that we can assess the gendered nature of all speeches.

These differences have implications for the interpretation of our findings — namely, that they apply at the speech level, and not at the level of debate. We do not, for example, look at positive and negative engagement with speeches given during budget debates compared with debates on a bill concerning education, but rather at reactions to speeches using language associated with topics regardless of when they occur during the parliamentary session. Women might talk more about education or healthcare during a budget debate, and men might attempt to turn a debate about healthcare into one on taxes and spending. Our approach picks this up, whereas such fine-grained differences would be difficult to hand-code. Unfortunately, we do not have metadata information on the categories or nature of debates. One could potentially combine both approaches by coding the nature of the debate, examining how well the topics of speeches within the debate correspond to the overall debate topic, and exploring whether this impacts the reactions that a speech receives. With debates covering 30 years across 16 states, such an approach goes beyond what we can accomplish within this study, but we hope that future work can address this.

Our topic modelling approach assumes that a speech is gender-congruent if its topic structure is similar to that of other speeches given by parliamentarians of the same gender as the speaker. In other words, we examine the relative usage of topics in speeches by male and female MPs. A speech given by a male MP that uses topics associated with other male MPs is male-congruent, while a speech given by a female that uses female topics is female-congruent. In turn, a role-incongruent speech is one where the speaker uses topics associated with the opposite gender. The examples of speeches in Appendices B and C further demonstrate the validity of our approach. In Appendix C we provide some further details about the LDA model including plots of topic proportions over time and across states.

The central tuning parameter of an LDA model is the number of topics K to be estimated. Depending on the nature of the text, that is, how many different latent topics there are in the corpus, the outcome of the model will be more or less sensitive to the K chosen. If K is too small, texts that are truly about different topics will be lumped together in the same estimated topic. If K is too large, texts ostensibly on the same topic will be split. The number of topics is not critically important for our design, however, as we care mainly about distance measures between speeches that are not that sensitive to K. We simply need to estimate a sufficient number of topics so that there is variation in the degree to which the estimated topics are gendered. Still, obtaining more coherent topics will make our results easier to interpret. As such, we selected K based on a manual inspection of topic coherence and visual assessment of the variation in the gendered nature of topics. A model using 30 topics provides good outcomes with coherent topics that also vary in the degree to which they are gendered. With the trained LDA model in hand, we can then apply it to the speeches to form a topic-share vector W with 30 non-negative values adding up to one.

Gender congruity is operationalized as the predicted probability that a binary regression model assigns the correct gender to the speaker as a function of the topic shares in that speech. To score the topics by gender, we run a series of logistic regressions — one for each topic — to predict the gender F_{im} of speaker m (female = 1) based on the share for topic $k \in 1, ..., K$, after residualizing out state, year, and party fixed effects. These regressions produce a parameter vector Θ with K coefficients, with each coefficient θ_k giving the conditional relationship of topic k's prevalence on speaker gender F_{im} after controlling for state, year, and party. Positive topic coefficients imply that a topic is associated with female speakers while negative coefficients imply that a topic is associated with male speakers.

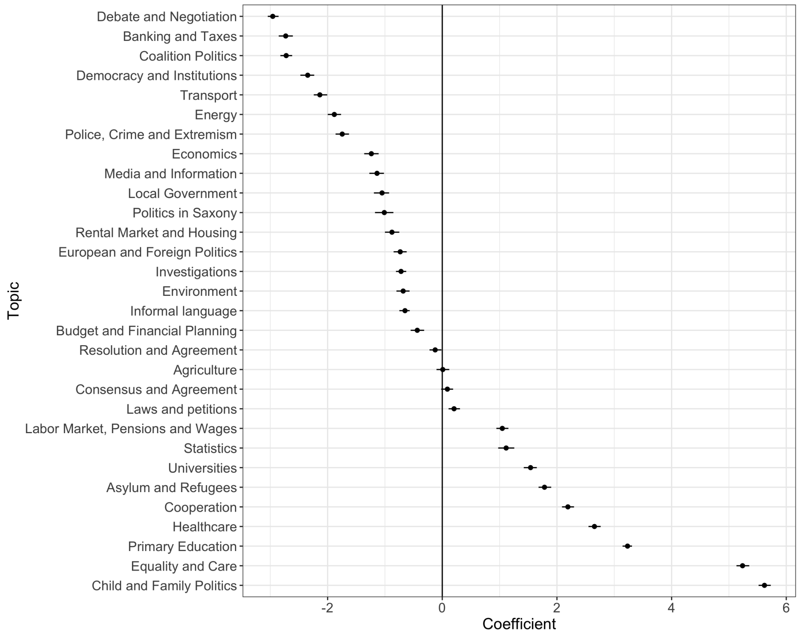
Figure 2 displays the relationship between LDA topics and gender sorted by θ_k. A positive coefficient means the topic is associated with women and a negative coefficient is associated with men. Table 1 shows the most characteristic words for the most female and most male

Table 1: Topic Labels and Top FREX Words

Topic Number	Label	Example FREX Words
27	Debate and Negotiation	belief, discussion, notice, in so far as
10	Banking and Taxes	banks, savings and loans, VAT, wealth tax, inheritance tax
22	Coalition Politics	Stegner, red-green, Laschet, minister-president, governing coalition agreement
16	Democracy and Institutions	petition, constitutional change, voter participation, right to vote
15	Transport	train, local public transport, airport, rail, transport policy
28	Energy	energy, CO2, renewable, energy policy
7	Police, Crime and Extremism	criminality, right-extremism, police, perpetrator
25	Economics	economic policy, middle class, hand-worker, support for economy
20	Media and Information	data protection, radio, broadcaster, ard, zdf
18	Local Government	communes, municipalities, reform
8	Politics in Saxony	state government, Jurk, Biedenkopf
11	Rental Market and Housing	renter, apartment market, region
23	European and Foreign Politics	brexit, mercenaries, European policy, dictator
12	Investigations	examination committee, files, documents, informed
4	Environment	forest, national parks, protection from flooding
6	Informal language	informal form of "you" (singular and plural) and colloquial language
29	Budget and Financial Planning	budget, draft budget, budget year, financial planning
19	Resolution and Agreement	proposal, reject, agree, alternative proposal
14	Agriculture	farmers, animal protection, food, milk
26	Consensus and Agreement	together, thoughts, warm thanks, constructive, success
5	Laws and petitions	law, proposal, petition, law change
30	Labor Market, Pensions and Wages	minimum wage, pension, wage, long-time unemployed
24	Statistics	percent, statistics, study, reduced, increased, average
21	Universities	tertiary education, universities, students, student fees
17	Asylum and Refugees	refugees, asylum applicant, hard case, asylum, citizenship, humanitarian
3	Cooperation	recommendations, working groups, rework, cooperation, bring in, develop
13	Healthcare	patients, doctors, health insurance, hospital, midwives
1	Primary Education	students, lessons, teachers, gymnasium, school year, classes
9	Equality and Care	disability, men, seniors, those in need of care, women, equality, politics, mainstreaming
2	Children and Family	childcare worker, nursery, youth support, daycare facility, money for care, child poverty

Notes. Topic labels ordered from most associated with male to most associated with female, by gender coefficient from logistic regression of speaker gender on LDA topic share. Columns give topic number, manually assigned label, and sample of associated words using FREX (see Roberts, Stewart and Tingley, 2019).

Figure 2: Ranking of Topics by Gender Association



Notes. List of topics generated from the LDA topic model, sorted by the gender coefficient estimated from a logistic regression of speaker gender on each speech's LDA topic share. Positive coefficients indicate female-oriented topics. Error bars give 95% confidence intervals. Further information about the logistic regressions is found in Appendix E.

topics using the FREX measure (see Roberts, Stewart and Tingley, 2019), along with a manually assigned label. The resulting topic-gender relationship is consistent with previous work. First, topics associated with female MPs show a strong communal focus: 1) children and family politics, 2) equality, care and the elderly/disabled, 3) primary and secondary education, 4) healthcare 5) cooperation and working method, and 6) asylum and refugees. The strong association between these topics and female speakers is in line with the predictions of a large part of the literature arguing that women speak more not only about communal topics but also about issues that are relevant for women specifically (Phillips, 1998; Norris and Lovenduski, 2001). They are also similar in nature to topics uncovered in other similar work on German state parliaments (Kroeber, 2022). Second, topics associated with male MPs — debate and negotiation, banking and taxes, coalition politics, democracy, transport, and energy — show a strong association to agentic topics traditionally viewed as in the male domain.

With gender scores by topic in hand, we can extrapolate gender scores to speech. For each speech i, we multiply the vector of topic shares W_i from the LDA model with the vector of logit coefficients predicting gender. The resulting score $\hat{F}_i = W_i'\Theta$ provides a continuous indicator of the gendered nature of individual speeches to be used in empirical analysis. Congruence for female MPs increases in $\hat{F}_i$ and congruence for male MPs decreases.

4.2 Estimating the Effect of Role Incongruity on Parliamentary Reactions

Our estimation approach is linear regression with fixed effects. For each speech i, we have a count over parliamentary reactions – applause, cheerfulness, agreement, interjection, laughter, unrest, disagreement – indexed by r. Hence we define the outcome variable y^r_{impst} as log of 1 plus the number of times reaction r occurs during speech i, spoken by MP m of party p in the parliament of state s during year t. We also run models with the logged sum of all positive reactions, the logged sum of all negative reactions, the share of positive reactions over the total number of reactions (speeches without any reactions are dropped), and finally, where the outcome is defined as the presence of *any reaction*, regardless of type.

First, to test H1, we regress

$$y^r_{impst} = \alpha_p + \alpha_s + \alpha_t + \rho^r F_m + X'_{impst}\beta + \varepsilon^r_{impst} \tag{1}$$

for each reaction type r, where the main treatment variable F_m equals one if MP m is female and zero if male. To adjust for confounding factors, α_p includes party fixed effects, α_s includes state fixed effects, α_t includes time (year) fixed effects, and X_{impst} includes a range of additional covariates: the age of the speaker (as it may influence an MP's authority and experience), the length of the speech (as there are more opportunities to react to longer speeches), the total length of speeches given by the MP during the whole parliamentary period (a measure of the speaker's seniority and level of legislative activity), a dummy for speakers who are members of the executive (state government), and an indicator for the topic most prevalent in the speech (taken from the LDA model). We present standard errors clustered on MP.

The coefficient ρ^r summarizes the gender effect on reaction type r. If hypothesis H1 is correct we would find a positive estimate of female gender ($\rho^r < 0$) for negative reactions (interjection, laughter, unrest and disagreement) and a negative effect ($\rho^r > 0$) for positive reactions (applause, cheerfulness and agreement).

To estimate the effects of gender incongruity, we adapt the OLS model by interacting our dummy for gender with $\hat{F}_i$, our predicted "female speech" score:

$$y^r_{impst} = \alpha_p + \alpha_s + \alpha_t + \gamma^r_0 F_m + \gamma^r_1 \hat{F}_{impst} + \gamma^r_2 F_m \cdot \hat{F}_{impst} + X'_{impst}\beta + \varepsilon^r_{impst} \tag{2}$$

where we have added an interaction of $\hat{F}_{impst}$ with MP gender. We expect the coefficient on $\hat{F}_{impst}$ to be negative for positive reactions and positive for negative reactions. Men should receive more negative reactions and fewer positive reactions when giving speeches on female-gendered topics. Likewise, we expect the sum of γ^r_1 and γ^r_2 to be positive for positive reactions and negative for negative reactions. Women should receive more positive reactions and fewer negative reactions when giving speeches on female-gendered topics.

Finally, we have run models where, instead of year fixed effects, we include as a control the share of women in parliament. This approach captures the idea that patterns change as more women enter the legislature, perhaps the result of passing a critical threshold of women. We find no evidence that the share of women in the state legislatures matters. As such, we prefer the fixed-effects models as they control for any over time variation, and not just that associated with the percentage of women. We present these and other models in Appendix G.

We have also looked at change in topic composition over time and across states to examine whether the female topic share increases over time. Topic proportions are presented in Appendix C. With the exception of the immigration topic, which spikes in 2015 as we would expect, the topic proportions of gendered topics remain steady over time. We do not see systematic differences in topic proportions across states, with top male topics consistently accounting for a higher share of speeches. This gap does appear somewhat smaller in the states of former East Germany.

5 Results

5.1 Effect of Gender

We run eleven separate regression models in which our dependent variables are our six logged reaction counts, the logged sum of positive reactions, the logged sum of negative reactions, the share of positive reactions, and the presence of any reaction on female gender. We regress these dependent variables on the controls described above. The central results — the magnitude of the female gender dummy on the reaction counts — are visually displayed in the coefficient plot in Figure 3. The plot shows the effect estimates for the variable indicating a female parliamentarian as well as the 95 percent confidence intervals around it for each of our models. The regression output is included in Appendix **??**. The different types of reactions are classified as to whether they convey a positive or negative attitude.

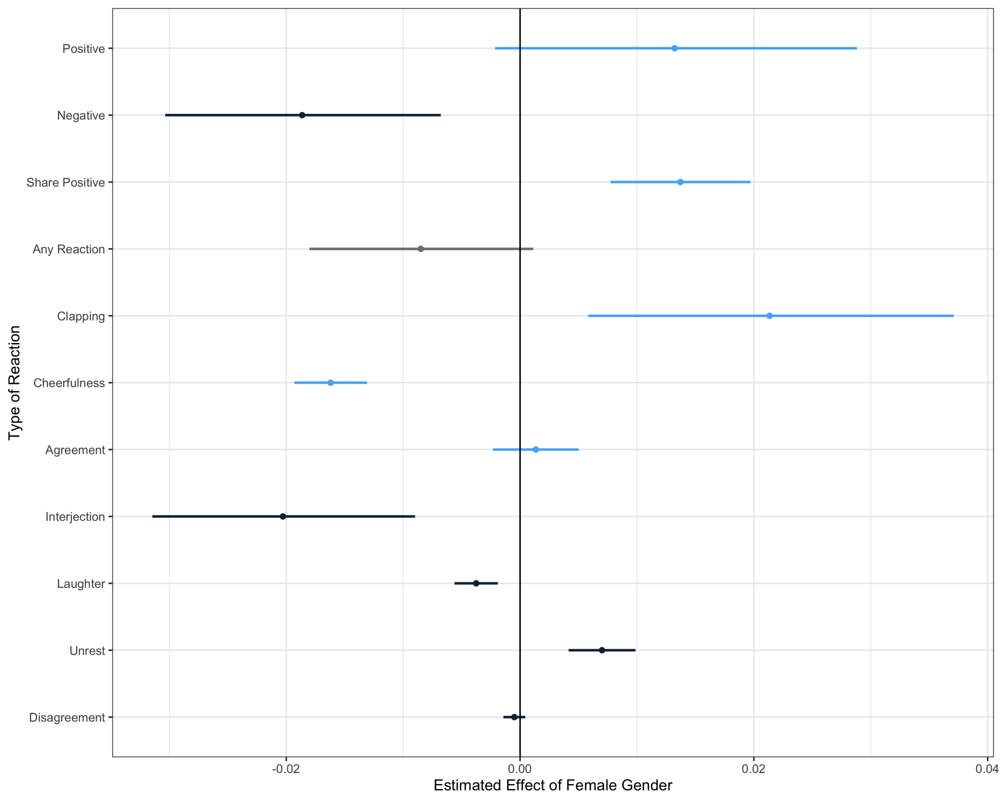


Figure 3: Coefficients of Female Gender on Different Reaction Types

Notes. Coefficients of gender from separate regression models for each reaction. Full regression results are presented in Table **??** in Appendix **??**. Error bars give 95% confidence intervals using robust standard errors clustered on MP. Blue represents positive reactions and black negative.

The results offer little support for H1. Female MPs receive on average (slightly) more positive reactions (statistically significant at the 10% level) and fewer negative reactions than male MPs. Of the reactions that female MPs receive, more are positive than negative. Women also appear to be somewhat less likely to receive any kind of reaction at all. Women receive more applause but less cheerfulness. Likewise, speeches by women are subject to less interjection and laughter, but more unrest. There is no statistically significant effect of gender for agreement and disagreement.

5.2 Effect of Role Congruity

In our second set of regression analyses, the main coefficient of interest is the interaction between gender of the speaker and the estimated gendered nature of the speech given the topics it contains. Figure 4 presents eleven interaction plots, one for each of our dependent variables. The plots present the predicted logged count of the reaction in question on the y-axis and the predicted gendered nature of the speech (calculated from our regressions following the LDA model) on the x-axis. The solid line shows the relationship between the gendered nature of speech and reaction counts when men are giving the speech and the dashed line shows the relationship when women are giving the speech. For male speakers gender congruence is associated with negative x-axis values, and for female speakers gender congruence is associated with positive values.

We notice two main patterns. First, regardless of the gender of the speaker, speeches that are gendered female (positive x-axis values) tend to receive fewer reactions of any kind than those gendered male. The only exception to this statement is with *agreement*, where we see a slight, statistically insignificant, upward trend for both men and women speakers. However, this type of reaction occurs very infrequently.

The second noticeable pattern is that male speakers receive more reactions from the floor than women speakers when giving gender-congruent, male-gendered, speeches. The male prediction line is consistently higher than the female line for negative x-axis values. This difference is statistically significant for models of all positive reactions, applause, and any reaction.

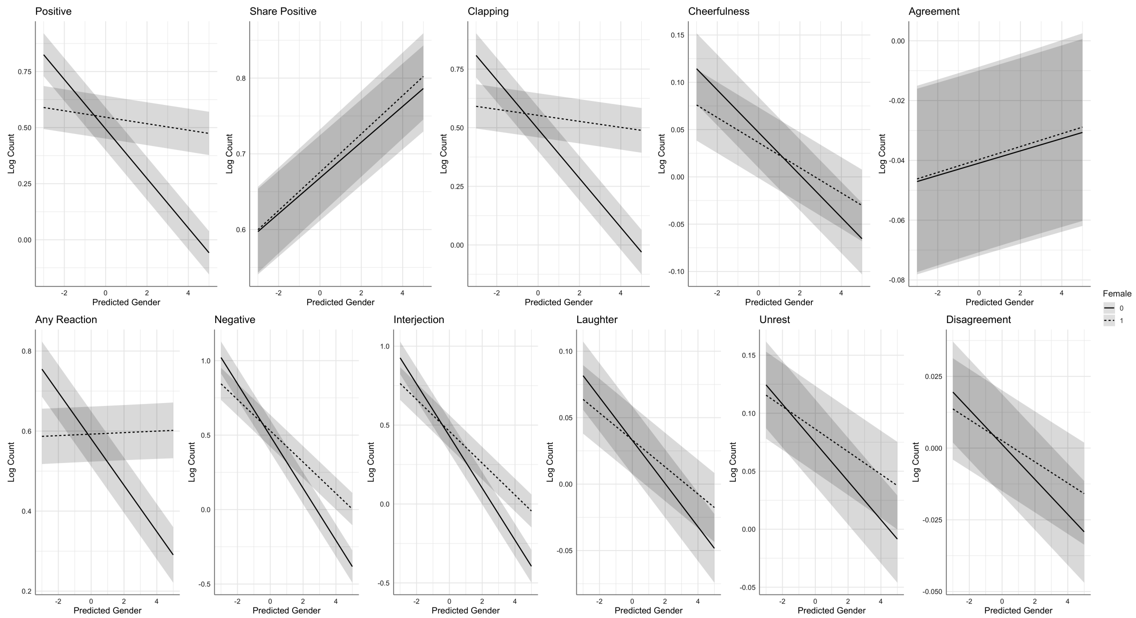


Figure 4: Interaction Plots for the Effect of Role Congruity on Reactions (logged counts)

Notes. Results from separate regression models for each reaction. Full regression results are presented in Table A.4 in Appendix F. Shaded region represents 95% confidence intervals using robust standard errors clustered on MP.

For female-gendered speeches, women speakers receive far more positive reactions, applause in particular, than male speakers, but they also more receive more interjections. Indeed, women speakers are more likely to receive reactions than men, in general, when speaking on female-gendered topics. While the level of applause is largely unaffected by the gendered nature of the speech for female speakers, male MPs receive far more applause when giving male-gendered speeches than when giving female-gendered speeches. A similar pattern is evident, although less stark, for all reactions except agreement.

In sum, there is substantial evidence that both gender and gender congruence matters when it comes to the reactions that speakers receive from their peers. However, we find little evidence for the first hypothesis — female speakers do not experience more negative reactions to their speeches than male speakers. With respect to the second, gender congruence certainly matters, but it appears to matter more for male MPs than female MPs. Male MPs receive far fewer reactions of any kind when giving a speech on a female topic. This may be evidence of a substitution effect (Höhmann, 2020). In contrast, the number of reactions that women MPs receive is far less contingent on the gendered nature of the speech's topic. Nevertheless, the women's slopes are negative for many reactions, meaning they, too, experience fewer reactions when giving a female-gendered speech.

6 Potential Mechanisms

We have demonstrated that speeches on male and female topics receive different levels of reaction, and that the congruence between the gender of the speaker and the topic of debate matter for the level of reaction. However, there could be several mechanisms that lead to these observed patterns. Although testing these mechanisms is beyond the scope of the paper, we nevertheless lay out four possibilities and briefly discuss them. The list is not meant to be exhaustive.

A first mechanism could simply be variation in attendance at plenary sessions — the number and nature of MPs in the chamber may differ for different types of debates and some types of debates may be more likely to contain speeches on women's topics. If women's topics are perceived as lower salience, fewer MPs may attend sessions with more speeches on female topics. Similarly, a higher proportion of attendees during debates on topics associated with women might be women, who also may react more often and more positively to women than men. To systematically test this mechanism, we would need data on attendance. While some of the transcripts do record attendance, it is not recorded in a systematic manner across time and states and cannot simply be parsed from the pdfs. Thus we are unable to control for the levels of attendance or who is in the audience for a given speech. Nevertheless, because we estimate the topics of speeches (not debates), we do have large numbers of female-gendered speeches given during highly salient debates (e.g., budget debates). As mentioned earlier, future work that combines the coding of debate topic with speech topic could help to uncover this mechanism.

A second mechanism could be that women and men react differently to speeches on different topics and to different speakers. Even if attendance in the chamber is the same, men may simply stay silent on women's topics, perhaps feeling uncomfortable about reacting to speeches by women on topics perceived to be women's issues. To systematically examine this mechanism, we would require data on who reacts to whom, which we do not have. We do, however, have data on the share of women MPs by parliamentary session and state. If women are reacting differently to women's speeches, we may expect to see different patterns as the number of women in parliament increases. As mentioned earlier, we have run models including the share of female MPs in parliament. We have also interacted this variable with the predicted and actual gender of the speaker to examine whether role congruence functions differently as the number of women in parliament increases. We find no evidence that it does, nor do we find any direct effect of the share of women in the chamber on the nature of reactions. These null findings provide preliminary evidence that men and women do not tend to react differently.[7]

A third mechanism could be that the topics classified as female are simply less controversial and therefore generate less interest and fewer reactions. This is related to the salience argument mentioned above. Again, this could be proxied by attendance, which we do not have. Nor do we have direct data on the degree of controversy regarding particular issues. However, the topics that we estimate to be women's issues include some sensitive and controversial issues, such as immigration, and these speeches can be held during high profile debates.

A final mechanism could relate to the different gendered patterns in how men and women speak (see, e.g., Wäckerle and Castanho Silva, 2023). Perhaps different tones and debate styles draw different types of reactions from the audience. If women's tone and style of speech draw fewer (and more positive) reactions, that could help to explain the patterns that we find here. It could also imply that there are male MPs whose speaking style is more feminine and therefore subject to fewer reactions. Alternatively, women with deeper voices and more masculine style might attract more reactions. This is something that future research could investigate using audio recordings.

7 Conclusion

Using new data parsed from German state parliament debate transcripts, we have demonstrated that gender clearly affects informal reactions to parliamentary speeches. The gender of a speaker impacts the frequency of reactions to their floor speeches, but not in the expected man-

[7] This contrasts somewhat with findings by Karpowitz and Mendelberg (2014), who suggest that there is an interaction between the number of women and the rules of decision-making.

ner. Instead of receiving more interjections and other negative reactions, both as role congruity theory might predict and as has been found in other legislative settings (Miller and Sutherland, 2022), we find that female MPs receive more positive reactions and fewer negative reactions to their speeches. Likewise, there is a significant effect of gender congruity on positive reactions. Speeches with a feminine topic given by a woman receive more positive feedback, applause in particular, than the same speeches given by a man, and vice versa. In contrast, men giving speeches on women's topics are largely ignored, at least with regard to reactions from the floor. Moreover, speeches by women and those engaging with women's topics receive fewer reactions of any kind. Overall, there is simply less engagement with women's speeches and women's topics.

These findings have important theoretical and normative implications. Theoretically, they suggest a more complicated relationship than the double bind proposed by RCT. It is not that women are always subject to more negative reactions due to incongruence between their gender and their role as an MP, but rather that there exists a gender gap when it comes to ignoring and engaging with MPs' speeches. Our results also highlight the importance of examining how men engage with issues associated with women.

Normatively, our evidence further confirms that parliaments are best understood as gendered institutions. Informal reactions to parliamentary debates, just like formal debate participation, follow gendered patterns. Differences in these informal reactions to male and female speakers and to gender congruence between speaker and topic have a number of implications for how we think about gender and parliaments. On the one hand, we could view it as normatively desirable that women speakers are not subject to more negative reactions then men. However, the lack of reaction to speeches on female-gendered speeches (regardless of the actual gender of the speaker) could indicate either that topics deemed feminine are subject to less scrutiny, or that these topics are perceived as less important than male topics. Teasing out the precise causal mechanisms behind our findings, as well as the link between topic of speech and topic of debate as a function of gender, will give rise to new normative considerations about the role of gender in parliaments and will be a fruitful subject for future research.

References

Acker, Joan. 1990. “Hierarchies, Jobs, Bodies: A Theory of Gendered Organizations.” *Gender & Society* 4(2):139–158.

Acker, Joan. 1992. “From Sex Roles to Gendered Institutions.” *Contemporary Sociology* 21(5):565–569.

Azari, Julia R. and Jennifer K. Smith. 2012. “Unwritten Rules: Informal Institutions in Established Democracies.” *Perspectives on Politics* 10(1):37–55.

Bäck, Hanna and Marc Debus. 2016. *Political Parties, Parliaments and Legislative Speechmaking*. Basingstoke: Palgrave Macmillan.

Bäck, Hanna and Marc Debus. 2019. “When Do Women Speak? A Comparative Analysis of the Role of Gender in Legislative Debates.” *Political Studies* 67(3):576–596.

Bäck, Hanna and Marc Debus. 2020. “Personalized versus Partisan Representation in the Speeches of Migrant Members of Parliament in the German Bundestag.” *Ethnic and Racial Studies* 43(9):1673–1691.

Bäck, Hanna, Marc Debus and Jochen Müller. 2014. “Who Takes the Parliamentary Floor? The Role of Gender in Speech-Making in the Swedish Riksdag.” *Political Research Quarterly* 67(3):504–518.

Barnes, Tiffany. 2016. *Gendering Legislative Behavior*. Cambridge: Cambridge University Press.

Benoit, Kenneth, Kohei Watanabe, Haiyan Wang, Paul Nulty, Adam Obeng, Stefan Müller and Akitaka Matsuo. 2018. “Quanteda: An R Package for the Quantitative Analysis of Textual Data.” *Journal of Open Source Software* 3(30):774.

Blei, David M. 2003. “Latent Dirichlet Allocation.” *Journal of Machine Learning Research* 3:993–1022.

Blätte, Andreas and Andre Blessing. 2018. The GermaParl Corpus of Parliamentary Protocols. In *Proceedings of the Eleventh International Conference on Language Resources and Evaluation (LREC 2018)*. Miyazaki, Japan: European Language Resources Association (ELRA) pp. 810–816.

Burkhardt, Armin. 1992. »Das ist eine Frage des Intellekts, Frau Kollegin!«. In *Die Geschlechter im Gespräch*, ed. Susanne Günthner and Helga Kotthoff. Stuttgart: J.B. Metzler pp. 287–309.

Burkhardt, Armin. 2013. *Zwischen Monolog und Dialog*. Berlin: De Gruyter.

Catalano, Ana. 2009. "Women Acting for Women? An Analysis of Gender and Debate Participation in the British House of Commons 2005–2007." *Politics & Gender* 5(1):45–68.

Celis, Karen, Sarah Childs, Johanna Kantola and Mona Lena Krook. 2008. "Rethinking Women's Substantive Representation." *Representation* 44(2):99–110.

Celis, Karen and Silvia Erzeel. 2015. "Beyond the Usual Suspects: Non-Left, Male and Non-Feminist MPs and the Substantive Representation of Women." *Government and Opposition* 50(1):45–64.

Chappell, Louise. 2006. "Comparing Political Institutions: Revealing the Gendered "Logic of Appropriateness"." *Politics & Gender* 2(2):223–235.

Childs, Sarah and Mona Lena Krook. 2006. "Should Feminists Give Up on Critical Mass? A Contingent Yes." *Politics & Gender* 2(4):522–530.

Colley, Linda and Elizabeth Acker. 2020. "Women's Selection into Parliament: The Interplay between Formal Rules and Informal Practices." *The Journal of Legislative Studies* 27(3):1–22.

Collier, Cheryl and Tracey Raney. 2018. "Understanding Sexism and Sexual Harassment in Politics: A Comparison of Westminster Parliaments in Australia, the United Kingdom, and Canada." *Social Politics: International Studies in Gender, State & Society* 25(3):432–455.

Dietrich, Bryce J., Matthew Hayes and Diana Z. O'Brien. 2019. "Pitch Perfect: Vocal Pitch and the Emotional Intensity of Congressional Speech." *American Political Science Review* 113(4):941–962.

Dörner, Andreas and Ludgera Vogt. 2011. *Sprache des Parlaments und Semiotik der Demokratie*. Berlin: De Gruyter.

Eagly, Alice H. 1978. *Sex Differences in Social Behavior*. 1. ed. London: Psychology Press.

Eagly, Alice H. and Steven J. Karau. 2002. "Role Congruity Theory of Prejudice toward Female Leaders." *Psychological Review* 109(3):573–598.

Erikson, Josefina and Cecilia Josefsson. 2019. "The Legislature as a Gendered Workplace: Exploring Members of Parliament's Experiences of Working in the Swedish Parliament." *International Political Science Review* 40(2):197–214.

Fernandes, Jorge M., Marc Debus and Hanna Bäck. 2021. "Unpacking the Politics of Legislative Debates." *European Journal of Political Research* 60(4):1032–1045.

Gervais, Sarah J. and Amy L. Hillard. 2011. "A Role Congruity Perspective on Prejudice Toward Hillary Clinton and Sarah Palin." *Analyses of Social Issues and Public Policy* 11(1):221–240.

Goddard, Dee. 2019. "Entering the Men's Domain? Gender and Portfolio Allocation in European Governments." *European Journal of Political Research* 58(2):631–655.

Gross, Martin and Svenja Krauss. 2021. "Topic Coverage of Coalition Agreements in Multi-Level Settings: The Case of Germany." *German Politics* 30(2):227–248.

Helmke, Gretchen and Steven Levitsky. 2004. "Informal Institutions and Comparative Politics: A Research Agenda." *Perspectives on Politics* 2(4):725–740.

Herzog, Alexander and Kenneth Benoit. 2015. "The Most Unkindest Cuts: Speaker Selection and Expressed Government Dissent during Economic Crisis." *The Journal of Politics* 77(4):1157–1175.

Höhmann, Daniel. 2020. “When Do Men Represent Women’s Interests in Parliament? How the Presence of Women in Parliament Affects the Legislative Behavior of Male Politicians.” *Swiss Political Science Review* 26(1):31–50.

Höhmann, Daniel. 2020. “When Do Female MPs Represent Women’s Interests? Electoral Systems and the Legislative Behavior of Women.” *Political Research Quarterly* 73(4):834–847.

Imre, Michael, Alejandro Ecker, Thomas M. Meyer and Wolfgang C. Müller. 2022. “Coalition Mood in European Parliamentary Democracies.” *British Journal of Political Science* p. 1–18.

Karpowitz, Christopher F. and Tali Mendelberg. 2014. *The Silent Sex*. Princeton: Princeton University Press.

Kroeber, Corinna. 2022. “When Do Men MPs Claim to Represent Women in Plenary Debates—Time-Series Cross-Sectional Evidence from the German States.” *Political Research Quarterly* 0(0).

Krook, Mona Lena and Diana Z. O’Brien. 2012. “All the President’s Men? The Appointment of Female Cabinet Ministers Worldwide.” *The Journal of Politics* 74(3):840–855.

Lippmann, Quentin. 2022. “Gender and Lawmaking in Times of Quotas.” *Journal of Public Economics* 207:1–17.

Mackay, Fiona, Meryl Kenny and Louise Chappell. 2010. “New Institutionalism Through a Gender Lens: Towards a Feminist Institutionalism?” 31(5):573–588.

Miller, Michael G. and Joseph L. Sutherland. 2022. “The Effect of Gender on Interruptions at Congressional Hearings.” *American Political Science Review* pp. 1–19.

Norris, Pippa and Joni Lovenduski. 2001. “Blair’s Babes: Critical Mass Theory, Gender, and Legislative Life.” Available at SSRN: http://dx.doi.org/10.2139/ssrn.288548.

O’Brien, Diana Z. 2015. “Rising to the Top: Gender, Political Performance, and Party Leadership in Parliamentary Democracies.” *American Journal of Political Science* 59(4):1022–1039.

Och, Malliga. 2020. "Manterrupting in the German Bundestag: Gendered Opposition to Female Members of Parliament?" *Politics & Gender* 16(2):388–408.

Paxton, Pamela, Melanie M Hughes and Matthew A Painter. 2010. "Growth in Women's Political Representation: A Longitudinal Exploration of Democracy, Electoral System and Gender Quotas." *European Journal of Political Research* 49(1):25–52.

Phillips, Anne. 1998. *The Politics of Presence*. Oxford Political Theory revised ed. Oxford: Oxford University Press.

Piscopo, Jennifer M. 2011. "Rethinking Descriptive Representation: Rendering Women in Legislative Debates." *Parliamentary Affairs* 64(3):448–472.

Proksch, Sven-Oliver and Jonathan B. Slapin. 2010. "Position Taking in European Parliament Speeches." *British Journal of Political Science* 40(3):587–611.

Proksch, Sven-Oliver and Jonathan B. Slapin. 2012. "Institutional Foundations of Legislative Speech." *American Journal of Political Science* 56(3):520–537.

Proksch, Sven-Oliver and Jonathan B. Slapin. 2015. *The Politics of Parliamentary Debate*. Cambridge: Cambridge University Press.

Roberts, Margaret E., Brandon M. Stewart and Dustin Tingley. 2019. "Stm: An R Package for Structural Topic Models." *Journal of Statistical Software* 91(2):1–40.

Schneider, Monica C. and Angela L. Bos. 2019. "The Application of Social Role Theory to the Study of Gender in Politics." *Political Psychology* 40(1):173–213.

Schwindt-Bayer, Leslie A. 2010. *Political Power and Women's Representation in Latin America*. New York, NY: Oxford University Press.

Schwindt-Bayer, Leslie A and William Mishler. 2005. "An Integrated Model of Women's Representation." *The Journal of Politics* 67(2):407–428.

Sczesny, Sabine, Christa Nater and Alice H. Eagly. 2019. Agency and Communion: Their Implications for Gender Stereotypes and Gender Identities. In *Agency and Communion in Social Psychology*, ed. Andrea E. Abele and Bogdan Wojciszke. London: Routledge pp. 103–116.

Swers, Michele L. 2013. *Women in the Club*. Chicago, IL: University of Chicago Press.

Trapnell, Paul D. and Delroy L. Paulhus. 2012. "Agentic and Communal Values: Their Scope and Measurement." *Journal of Personality Assessment* 94(1):39–52.

Tripp, Aili Mari and Alice Kang. 2008. "The Global Impact of Quotas: On the Fast Track to Increased Female Legislative Representation." *Comparative Political Studies* 41:338.

Valentim, Vicente and Tobias Widmann. 2021. "Does Radical-Right Success Make the Political Debate More Negative? Evidence from Emotional Rhetoric in German State Parliaments." *Political Behavior* .

Vera, Vallejo and Gómez Vidal. 2020. "The Politics of Interruptions: Gendered Disruptions of Legislative Speeches." *iLCSS Working Paper* (6):1–14.

Wäckerle, Jens and Bruno Castanho Silva. 2023. "Distinctive Voices: Political Speech, Rhetoric, and the Substantive Representation of Women in European Parliaments." *Legislative Studies Quarterly* .

Watanabe, Kohei and Yuan Zhou. 2022. "Theory-Driven Analysis of Large Corpora: Semisupervised Topic Classification of the UN Speeches." *Social Science Computer Review* 40(2):346–366.

Waylen, Georgina. 2014. "Informal Institutions, Institutional Change, and Gender Equality." *Political Research Quarterly* 67(1):212–223.

Williams, John E. and Deborah L. Best. 1990. *Measuring Sex Stereotypes*. Vol. 6 of *Cross-Cultural Research and Methodology Series* revised ed. Thousand Oaks, CA: Sage.

Appendix

Table of Contents

A Corpus Collection

This project is based on an original corpus of debate transcripts from all 16 German state parliaments in the past ca. 20 years. As the transcripts were not available in a structured format, it was necessary to process the original PDF documents and transform them into a structured format. This appendix gives an overview of the data collection.

A.1 Raw Data

All German parliaments on the state and federal level publish transcripts of their plenary debates which are written by a team of professional stenographers. They are available on the websites of the respective parliaments. Data collection was partly based on web scraping these websites, in some cases the administration of the parliament provided them. Transcripts for debates that happened earlier than the end of the 1990s are not available as machine-readable PDF documents but were only post-processed with an OCR software. This renders the parsing of these transcripts very error-prone and limits this data collection in most cases to the time after 2000.

The challenge in making use of the raw pdf data is recovering the formal structure that separates the names of speakers, metadata such as page numbers, speeches, and reactions. This is not a trivial problem because the often mentioned inherent ambiguity of language also extends to its more formal manifestations. To reliably automate the classification of text into relevant categories, clear criteria have to be found for each of the categories. Figure A.1 shows an example page taken from a transcript of the state parliament of Berlin. It clarifies the challenges which arise in building the parser.

Firstly, the header and footer lines have to be accounted for since they contain metadata and not an account of the parliamentary debate. The header includes the name of the parliament, its parliamentary period, the session number, and the date. All this information needs to be associated with the entire debate. The footer contains the page number which is specific to this page and must be correctly assigned to this page's content. The main body of the page is structured by four different elements. The beginning of each speech (henceforth speech-start)

Figure A.1: Example of a page from a parliamentary protocol

Abgeordnetenhaus von Berlin – 16. Wahlperiode **28. Sitzung vom 24. April 2008**

Bürgermeister Harald Wolf

formationen vor. In vielen Bereichen verzeichnen wir eine Steigerung des Frauenanteils, aber noch keine qualitative Veränderung, was das geschlechtsspezifische Rollenverhalten in der Berufswahl angeht.

Präsident Walter Momper:

Es gibt eine Nachfrage von Frau Senftleben. – Bitte schön!

Mieke Senftleben (FDP):

Vielen Dank, Herr Präsident! – Herr Senator! Nachdem Sie uns klar gemacht haben, dass der Girls' Day offensichtlich Sinn macht, frage ich Sie, wann es einen Boys' Day in Berlin geben wird.

[Beifall bei der FDP und der CDU – Oh! von der SPD und der Linksfraktion]

Sehen Sie persönlich eine Chance für einen Boys' Day, oder rechnen Sie weiterhin mit einer Blockade, obwohl wir in dem SPD-regierten Bezirk Charlottenburg-Wilmersdorf heute zum ersten Mal einen Boys' Day haben – eingerichtet von einer SPD-Bürgermeisterin? Sehen Sie Chancen für einen landesweiten Boys' Day?

[Beifall bei der FDP und der CDU – Zurufe von der SPD]

Präsident Walter Momper:

Wer ist im Senat für die Boys zuständig? – Herr Senator Wolf – bitte!

Bürgermeister Harald Wolf (Senatsverwaltung für Wirtschaft, Technologie und Frauen):

Sehr verehrte Frau Senftleben! Berechenbarkeit ist in der Politik eine wichtige Eigenschaft,

[Beifall bei der Linksfraktion, der SPD und den Grünen]

das gilt auch für Ihre jährliche Nachfrage zum Girls' Day, was denn der Boys' Day macht. Ich bleibe an dieser Stelle auch berechenbar: Der Girls' Day ist der Girls' Day, und er soll es auch bleiben.

[Beifall bei der Linksfraktion, der SPD und den Grünen]

Wir haben es mit einer geschlechtsspezifischen Benachteiligung von Frauen zu tun, und es muss daran gearbeitet werden, dies zu überwinden. Das andere ist die Arbeit an der Berufsorientierung von Jungen und jungen Männern sowie das Aufbrechen von Rollenstereotypen bei jungen Männern.

[Mieke Senftleben (FDP): Richtig!]

Das ist aber kein Thema, zu dem ich analog zum Girls' Day einen Aktionstag für sinnvoll halte. Dies ist eine Frage, die in der Berufsorientierung eine wichtige Rolle spielt. Wie Sie wissen, werden in den Schulen, die sich am Girls' Day beteiligen, entsprechende Unterrichtseinheiten und Diskussionen mit den in der Schule verbliebenen Jungen stattfinden. Ich halte dies für ein adäquates Verfahren. Wir sollten bei der Spezifik des Girls' Day bleiben und ihn nicht zu einem allgemeinen Tag der Berufsorientierung machen.

[Beifall bei der Linksfraktion, der SPD und den Grünen]

Präsident Walter Momper:

Danke schön, Herr Senator!

Es geht weiter mit der Mündlichen Anfrage Nr. 2 des Kollegen Sascha Steuer von der Fraktion der CDU zum Thema

Ignorante Bildungspolitik ohne Rücksicht auf die Schüler

verbunden mit den Mündlichen Anfragen Nr. 8 und 10. – Bitte schön, Herr Steuer!

Sascha Steuer (CDU):

Herr Präsident! Meine Damen und Herren! Ich frage den Senat:

1. Warum ignoriert der Senat die Erkenntnisse der ELEMENT-Studie zu Grundschulleistungen, die FU-Studie zum DDR-Geschichtsbild Berliner Schüler, die Brandenburg-Studie zur flexiblen Schulanfangsphase, und auf welcher wissenschaftlichen Grundlage macht der Berliner Senat Bildungspolitik?

2. Warum ignoriert der Senat den Wunsch Tausender Eltern, die ihre Kinder nach der vierten Klasse auf ein grundständiges Gymnasium schicken wollen, wenn sie an den Grundschulen nicht genug gefördert werden?

Präsident Walter Momper:

Danke schön! – Es folgt der Kollege Zillich von der Linksfraktion mit einer Anfrage zum Thema

ELEMENT-Studie

– Bitte schön, Herr Zillich!

Steffen Zillich (Linksfraktion):

Vielen Dank, Herr Präsident! – Sehr geehrte Damen und Herren! Ich frage den Senat:

1. Wie bewertet der Senat die jetzt vorgelegte dritte und abschließende Studie ELEMENT zur Entwicklung des Lese- und Mathematikverständnisses in den Jahrgangsstufen 4 bis 6 an Berliner Grundschulen und grundständigen Gymnasien, und teilt er die vom Autor Prof. Rainer Lehmann u. a. im „Zeit"-Interview – „Zeit" 17/2008 – vorgetragene Auffassung?

2511

includes the name, and in case of government members or the president the role, otherwise the party. Interjections in between the speeches, and the text of speeches are separated by formatting elements. Additionally, the announcement of a new issue to be debated is highlighted by bold text as can be seen in the upper half of the second column.

All these elements have to be computationally recognized to extract the transcript. When using normal speech text as the base category and excluding the headers and footers in advance, this leaves three categories. Detecting interjections is rather easy due to the brackets at the beginning and the end. Still it is not sufficient to use a regular expression searching for text in square brackets because there are also other text elements in brackets that would be incorrectly included. The bigger challenge is the speech-start parts since the colon which indicates reported speech is not unique to the format level of the transcript. It is likely that colons appear within speeches. This is further complicated by the high variation in possible roles and parties.

A.2 Encoding

Due to the high similarity in goals and methods, the data assembled in this project will follow the encoding of the GermaParl corpus, which encompasses debates from the German federal parliament for the time after 1996 (Blätte and Blessing, 2018). However, several changes were made. While a best practice when assembling a corpus, the URLs to the original sources cannot be included because in many cases access to the transcripts is channeled through a JavaScript interface that does not allow accessing the documents with an external link. In coding the interjections during debates, this corpus goes beyond the scheme used by Blätte and Blessing (2018) in that the interjections are categorized by their type.

A.3 Data Extraction

To solve the extraction problem, a combination of format and text markers is used. The intuition behind this is that the format is always more reliable than the text. When writing the transcripts, the staff of the parliaments will work in a pre-formatted template which reduces the possibility to make formatting mistakes. Format data also solves many problems of uniquely identifying text elements. A colon does not uniquely identify the start of a speech but a paragraph that starts with bold text and includes a colon does so with high accuracy.

Read PDF

The python package PyMuPDF was used to extract the data from the PDF-documents. The package returns a list of all objects contained in the documents with single characters being the highest granularity. All objects have data on their position, their font, and their text. Furthermore, a simple structuring into pages, text blocks, lines, and spans (text on one line in one font) is returned.

Sort Text in Reading Order and Aggregate Lines to Paragraphs

PDF documents are not necessarily encoded in reading order. This leads to the problem that often the structure returned by the package is not reflective of the true order on the page. To avoid a loss of accuracy on that level, all elements are ordered again into lines in reading order, on the page from top to bottom, and structured into blocks based on the difference in height to the above line. This results in paragraphs that can be passed on to categorize them.

Categorize Paragraphs

These paragraphs are then pre-filtered by their position to recognize text at the margins and in the header/footer that contains only meta-information on the debate. The remaining text contains the speech and is passed to a function that classifies every paragraph based on its indentation, bold text, and certain textual markers such as colons and brackets. Due to differences in format between transcripts from different parliaments, these criteria differ substantially. The result of this process is a data frame that contains all contents of the transcripts in reading order and categorized into three groups: reaction, speech-start, text.

Parse Speechstart and Interjections

After categorizing the paragraphs, speaker names and interjections have to be further processed to extract their meta information such as name, party, role, etc. The process is similar for both these elements. First, all non-word signs are removed. Then the string is tokenized and all tokens are sorted into different categories based on a list search. If a token is found in the list, it is put in the respective category, otherwise, it is passed on to the second list. First, the tokens are checked against a name list of all members of parliament in the dataset.

If they are not found in that list, a search is performed on a list of party names. In the case of speaker names, the remaining tokens contain nothing but the role of the speaker. For interjections, they indicate the type of interjection. Interjections are finally categorized into eight categories (including one residual category) which capture the seven most common types of interjections: applause (Beifall), laughter (Lachen), cheerfulness (Heiterkeit), interjection (Zuruf or Zwischenruf), unrest (Unruhe), approval (Zustimmung), and disapproval (Widerspruch).

B Examples of Interjections and Classification

Here we provide excerpts from speeches containing different types of reactions as they occur within the debate transcripts. We have selected these reactions as exemplary of their type after reading a much larger selection of randomly selected debates. Presenting these excerpts here serves several purposes. First, the examples help to demonstrate why we classify the reaction types as positive or negative and they provide face validity for these classifications. Second, they help to demonstrate the validity of our predicted gendered nature of speech variable. And third, they provide further validation of our topic model.

We specifically search for examples of reactions in speeches that fall into the 10% most male- and 10% most female-gendered speeches. Like the examples in Appendix C, they demonstrate that our LDA model successfully identifies topics in the speeches, and matches our expectations with respect to gender congruence. To translate the texts, we use Deepl.com. We only adjust the Deepl translation when we feel the translation is wrong or non-sensical.

B.1 Stenographers' Use of Classifications

Stenographers in German parliaments use a set number of terms for reactions in a very specific manner. These are described well in an article from the *Süddeutsche Zeitung* on the use of reactions during the first six months of the 19th German Bundestag available here: https://www.sueddeutsche.de/projekte/artikel/politik/die-afd-im-bundestag-e362724/

With respect to the difference between the laughter and cheerfulness, the article specifically notes:

> The stenographers have experience and a fine sense — they differentiate precisely between benevolent "cheerfulness," which actually expresses amusement, and aggressive "laughter," which is directed at or rather against the opponent. [...] In the Bundestag, laughter dominates as a means of distinction, self-exaltation and means to humiliate one's opponent. The political other, his arguments are laughed at, ridiculed, and the AfD uses this weapon "laughter" much more often than all other factions.

With respect to interjections, the article discusses the case of a CDU member giving a speech:

> The speech lasts a good five minutes, but he can barely finish a sentence because he is constantly interrupted by the AfD. At the end, as the transcript shows, there are 20 interjections, one every 15 seconds on average. The example shows how effective and destructive interjections can be: They are an intervention, they interrupt the argumentation, and unlike the interposed question, which according to the rules of the parliament a respective speaker may or may not allow, he cannot fend off the heckling.

This clearly shows the negative connotations associated with laughter and interjections — the two categorizations that are least clear when classifying reactions as positive or negative.

B.2 Example of Applause and Interjection

We begin with an example of a male speaker giving a male-gendered speech. The example comes from Berlin (16th election period, 22 March 2007) that shows how applause and interjection are used. The topic of debate as listed in the transcript is: "Current hour: An ecological model for the capital! - Taking up ideas from the Berlin Conference". Current hour (Aktuelle Stunde) describes the type of debate. This is a type of debate dedicated to a public discussion of a current issue or theme that at least one of the parties wants to discuss further. They are not tied to a bill and speakers receive 5 minutes per speech.

The primary topic of debate, as listed in the transcript, is environmental in nature. Much of the MP's speech concerns the environment (a topic that is not particularly gendered), but he frames his speech in terms of transport, a topic which, according to our model, is gendered male. Our model suggests that the speech is both about transport and the environment.

Excerpt from speech by Henner Schmidt (FDP):

> [...] I think there are other solutions. For me, the essential point is heavy traffic, which must be kept out of the city. We can reduce commercial traffic through innovative solutions, by combining rail, ship and cars. [...] I think there is a whole program that will achieve more than what is now intended with the environmental zone.
>
> [Applause from the FDP]
>
> You will see that. I think if you set up your measuring devices, you'll see after the introduction of the low emission zone that it doesn't do as much as you think [...]
>
> You can find more examples of this kind in Senate policy, from the coal-fired power plant to the wastewater concept, from noise protection to waste management. Again and again, ecologically weak, economically burdensome and poorly implemented.
>
> That's why we need a model including ecological components. The opposition will be happy to contribute ideas with its Berlin Conference - of which there will be more. We hope that the Senate will also take this on board.
>
> [Interjection from Dr. Wolfgang Albers (Left Party)].
>
> Therefore, dear Senate, dare for once to present a big idea, dare for once to tell the citizens where the journey should go in the long run.

B.3 Example of Cheerfulness and Applause

In a speech that occurs earlier in the session during the same debate, we find "cheerfulness" being used by stenographers to denote members of the speaker's party laughing at his joke. We see that cheerfulness comes from the speaker's own party and occurs when he makes a joke at the expense of another party, the Greens. It is a positive reaction towards the speaker. Here is an excerpt from a speech discussing Berlin's Tempelhof Airport as part of the same debate on "An ecological model for the capital."

Excerpt from speech by Dr. Wolfgang Albers (Left Party)::

> You'd have to dig deep into the pockets of the 6,000 private international patients, otherwise the thing won't work. But why you need an airline for 6,000 private patients is something you have not yet been able to explain to anyone.
>
> [Applause from the Left Party and the SPD]
>
> 6,000 divided by 365 – that's 16 passengers per day. We now have 850 passengers a day with a downward trend. Under your plan we would have 866 per day. Even if another 16 passengers come each day, we would have 882, and you want to keep Tempelhof open for that? More than 10 million € deficit per year already with more intensive operation in recent years, but you want to continue flying for 32 hospital passengers per day? [. . .] This is a combination of economic madness and ecological nonsense. [. . .] you cling to the alien concept of Tempelhof, then you take a closer look - and what is it? - A cloud cuckoo land! Oh dear!
>
> [Applause from the Left Party and the SPD]
>
> Perhaps you should rather turn Tempelhof into a huge parking lot for your hybrid cars,
>
> [Cheerfulness from the Left Party]

> then use local public transport, which we will make cheaper and more attractive together, so that you can get to a clean inner-city environmental zone, which the red-red coalition is creating for you. The start has been made. - Thank you very much!

[Applause from the Left Party and the SPD]

B.4 Example of Laughter and Unrest

Now we turn to another example of a male speaker speaking on a male topic, this one by Manfred Pentz (CDU) during the 101st sitting of the Hessen parliament on 8 March 2012. The speech makes accusations of patronage directed at Green politician Christine Scheel and her role at the energy firm HSE. The example demonstrates a stenographer's use of laughter and shows how it differs from cheerfulness in the previous example. We see that the laughter does not come from the party of the speaker, but rather from the party being attacked. The term is used to denote derisive laughter. The Green Party is, in effect, laughing at the CDU speaker to insinuate that what he is requesting will never happen. Unrest is then used to denote a general feeling of unease and discontent amongst the parties that the speaker is attacking. It is noteworthy that a speech by a male politician attacking a female politician has been classified by our model as a male-gendered speech.

Excerpt from speech by Manfred Pentz (CDU):

> Mr. President, Ladies and Gentlemen. For a little over a month now, a new member of the Board of Management has been employed at the Darmstadt-based energy supplier HSE. This board member is responsible for the area of sustainability and communications. The person in question is the former Green member of the Bundestag, Christine Scheel.
>
> In principle, it is positive when the transition from politics to business and vice versa works. But what is so different about Ms. Scheel? - Ms. Scheel did not seek a new path into business at the end of a political career. Rather, the suspicion

suggests itself that there was no longer any future in Berlin and that the exit strategy was to provide a politician from the Greens with a well-paid executive board mandate.

[Applause from the CDU and the FDP — Petra Fuhrmann (SPD): That is completely alien to the CDU! — More interjections from the SPD and the Alliance 90/The Greens]

Mr. Al-Wazir, the Green mayor of Darmstadt, Mr. Jochen Partsch, described it this way: It is probably a very unique event that someone is elected to the HSE board against the will of the majority shareholder.

Even the background to Ms. Scheel's nomination is questionable.

[Dr. Christean Wagner (Lahntal) (CDU): That's right!]

We had to learn from the press that leading representatives of the Greens from Berlin and Baden-Württemberg had deliberately exerted influence. Even in the press releases of HSE, one can only read about the Green politician Scheel again and again, but not about her professional competence. When you read all this and see how Ms. Scheel acts, you have to ask yourself: What qualifications does Ms. Scheel have apart from the simple possession of a Green party card?

[Applause from the CDU and FDP — Dr. Christean Wagner (Lahntal) (CDU): I'm asking you the same question! — Laughter from the BÜNDNIS 90/DIE GRÜNEN]

The question must be asked whether it is true that the former state secretary of the Greens in the Federal Ministry of Economics and Advisory Council in the energy company EnBW, Rezzo Schlauch, had an indirect or direct influence on the appointment to the HSE Board of Management.[. . .]

I'll tell you frankly and directly: We expect a clear statement from the state parliamentary group of the Greens today on the accusations and methods.

(Applause from the CDU and the FDP - Laughter from the BÜNDNIS 90/DIE GRÜNEN)

> We expect a clear and unequivocal distancing from the party-political patronage and the green felt described by the press.

[Tarek Al-Wazir (BÜNDNIS 90/DIE GRÜNEN): What does the patronage consist of? - Unrest from the SPD and the Alliance 90/The Greens)]

B.5 Example of Agreement

We now turn to an example of the stenographers' use of "agreement". This example comes from the 6th election period in Sachsen-Anhalt during the 48th sitting on the 11th of July 2013. It is also an example of female speaker giving a speech on a female topic. A party on the same side of the ideological spectrum as that of the speaker sounds their agreement.
Excerpt from speech by Ms. Grimm-Benne (SPD):

> Dear Ms. Zoschke, you have just explained why I said at the beginning that I would like to reject your motion. There will no longer be a Bundesrat session at which you can introduce this before the election date.
>
> The first two points, namely the reform of the statutory pension insurance and the withdrawal of the so-called Care-Bahr (Private Care Insurance), are election issues. I don't want to say that my party could not follow this. But that's the kind of election campaign bluster that I didn't want in the state parliament today.

[Applause from the SPD and the CDU]

> Rather, I wanted our nursing proposal to actually make it possible, especially in the area of generalist nursing training, in areas where we are talking about professional regulations, for this branch of the profession and the training profession to become so attractive that we can cover our need for skilled workers in Saxony-Anhalt.

Ms. Lüddemann, we support generalist or integrated nursing training. Nevertheless, as the Minister announced earlier, there is great concern at the moment, particularly with regard to those who train geriatric nurses, that this will remain a residual training area because the profession - and I agree with Ms. Zoschke here - is poorly paid, because it is very difficult and because it is an appendage to more attractive training areas such as nursing and health care. If we make this generalist, then we have to make sure that nursing care for the elderly is not neglected.

[Applause from the SPD — Agreement from the LEFT]

This applies in particular to the diseases that we will be confronted with in the future, such as dementia and gerontopsychiatric diseases in old age. This requires that we at least classify the occupational image of geriatric care in the area of nursing.

B.6 Example of Disagreement

In a final example, we present a speech by a female MP from Lower Saxony (15th election period, 129th meeting, 18 October, 2007) on the topic of gender equality. Our topic model has assigned this speech to the equality and care topic (7%) and marks it as a female gendered speech. The speech provides an example of "disagreement" and also shows that interjections are used by an opposing party to signal their disagreement. This further confirms that both disagreement and interjections have negative connotations.

Excerpt from speech by Frauke Heiligenstadt (SPD):

Mr. President, Ladies and Gentlemen! I am truly stunned,

[Applause from the SPD — Oh! from the CDU — More interjections from the CDU - President's bell]

when I hear here the state of discussion on equal rights for women and men that we are having. I have the feeling that this topic is not even a subject of the constitution

> yet. That is the way you are arguing here. In response to a question from my colleague Hemme, the Minister had to read out loud what is meant by equal rights, beyond simply compatibility of family and career. The Minister had to read it out! The way you talk about equal rights here is really an insult.
>
> [Disagreement from the CDU — Sound of President's Bell]
>
> Equal rights for women and men are a fundamental right. We have heard here several times today — hence my question — that this fundamental right, which has not even found acceptance, but must be redeemed immediately, is put on an equal footing with the self-administration right of the municipalities and the budgetary right of the municipalities and the state, and is also placed beneath the position of the reserved budget items. Therefore, my question is: Which fundamental rights do you actually want to voluntarily surrender?
>
> Loud applause from the SPD and the Greens — interjections from the CDU — Sound of the President's bell

C Topic Model

The topic model is run in the R statistical languague using the "seedlda" package version 0.8 (Watanabe and Zhou, 2022) with pre-processing done in the "Quanteda" package version 3.2 (Benoit et al., 2018). The topic model was run the ETH's Euler Cluster and took approximately 16 hours to run. Before running the LDA model, we take standard steps to pre-process the raw text. After tokenization, a list of general German stopwords is removed. Stopwords specific to the German parliamentary context are also excluded. These include the names of the respective states as well as their capitals in order to avoid the topic model sorting by state instead of topic. Symbols and numbers are also removed. Finally, all tokens are transformed to lowercase and converted to a token distribution over the whole dictionary.

Here we provide brief descriptions of speeches that score the highest as "female" and the speech that scores the highest as "male". Among those speeches that fall into the lowest decile of "predicted gender" (i.e., those predicted by our approach to be male), 86.6% are given by men. Among those in the highest decile (i.e., those predicted to be female) 48.3% are given by women. These results demonstrate that women are much more likely to give female gendered speeches. The imbalance across genders is expected as there are more male MPs and more speeches given by men. If we look at the top 2% of female-gendered speeches, women account for 60.9% percent of speeches. In the top 1% women account for 64% of speeches. And finally, of the 100 speeches that score highest as male, 91% were given by men. Of the 100 speeches that score highest as female, 76% were held by women.

The highest scoring female speech was given by Eva Gottstein of the *Freie Wähler* party in Bavaria on the 6th of July, 2017. It concerned the topic "Familienland Bayern", a phrase used by the govering CSU party to signify that Bavaria is family-friendly. In criticizing CSU policy, the speech touches on children, policies with respect to midwives, and poverty. The following are two short translated extracts from the speech:

> The social report confirms the risk of poverty. Families with three or more children, that is 15.4% of families, are now at risk of poverty. The situation is even worse for single parents. These are the tragic top group. 36.7% of single parents are at risk of poverty. I don't even want to talk about female poverty in old age, especially in Bavaria. We are glad that mothers now receive two pension points, something where the FREIEN WÄHLER played a role. We continue to demand the third pension point.
>
> ...
>
> After all, having children naturally marks the beginning of a family. A family comes into being through a child. In Bavaria, it is almost impossible to have a child without encountering problems. The midwifery profession is practically dying out. The midwives would be there, but they are no longer employed. We demand a liability exemption fund. We demand a support program for midwives. We demand that they receive appropriate wages.

The highest scoring male speech also comes from Bavaria and was given by Hans-Ulrich Pfaffmann of the SPD. It concerns infrastructure projects, namely the construction of a new runway at the Munich airport. It also starts with an insult.

> Mr. President, dear colleagues! It is always interesting that when Mr. Huber speaks the words "miserable failures" he looks to the left. Dear Mr. Huber, if I were in your position, I would take a mirror and write Transrapid and Landesbank on it and look into it yourself. There is really nothing more to say about Mr. Huber's speech. Ladies and gentlemen, it goes without saying that the third runway at Munich Airport is a very important transport infrastructure project. Many speakers have have said that already. It goes without saying that the airport and the planned third runway are a driving force for the European metropolitan region of Munich. There is absolutely no doubt about that. Dear Mr. Pointner, it goes without saying that the justified concerns of local residents, the use of land, and ecology must be weighed against each other. If that were not the case, there would be no need for us to argue about the best position in this chamber...Dear Mr. Huber, we find it increasingly difficult to ignore the justified interests of local residents. You are casually ignoring the interests of local residents in favor of making a quick decision.

The fact that the highest scoring male and female speeches come from relatively recent years in Bavaria is chance. A closer look at the full list of top-scoring male and female speeches reveals that they come from a wide range of states and time periods. To alleviate the concern that particular states and time periods drive the results, we now show that topic proportions for the most male and most female topics are quite stable over time and state. There is no clear pattern of topics differing between the former East and West Germany either.

Figure A.2 shows the share of the six top female topics over time since 2000. We begin the plot in 2000 because a very small number of states are in the dataset prior to 2000. The "cooperation" topic has decreased over time, the "asylum and refugee" topic spikes in 2015 at the time of the refugee crisis, and the "health" topic spikes in 2020 with the corona crisis. Otherwise, the topic proportions appear stable.

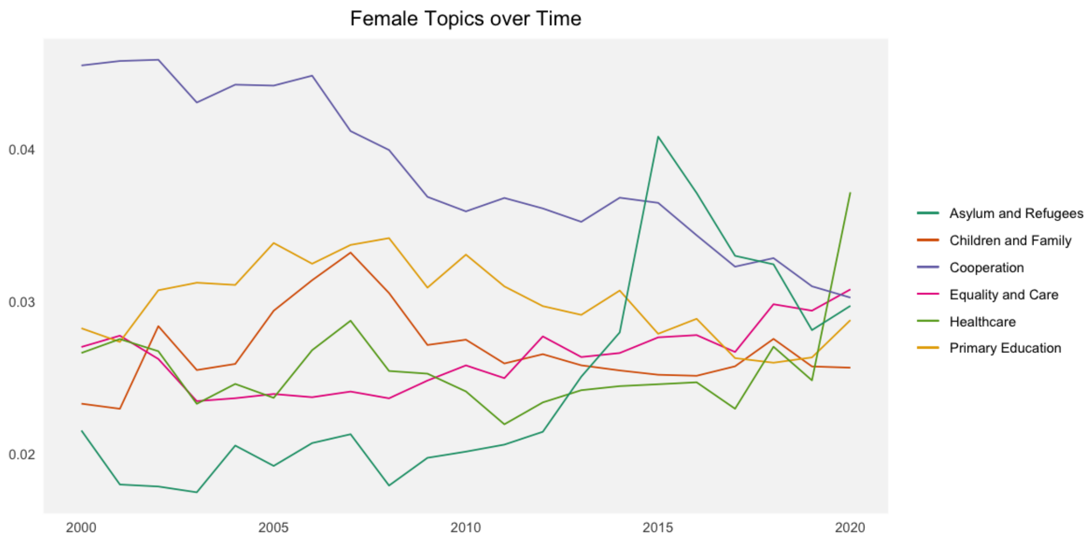


Figure A.2: Share of Top Female Topics over Time, 2000-2019

Figure A.3 shows the share of the six top male topics over time, again beginning in 2000. Here there is very little change over time in topic proportion, with the possible exception of a decline in the "debate and negotiation" topic. This mirrors the decline in the female top labelled "cooperation".

Figure A.4 displays for each state the sum of the top six female and male topics, which were plotted separately in Figures A.2 and A.3. Here we see few clear patterns across states. There may be somewhat less of a gap in topic proportions between male and female topics in the former East. Saarland, Bavaria and Hessen show a narrowing gap between between the proportion of gendered topics over time.

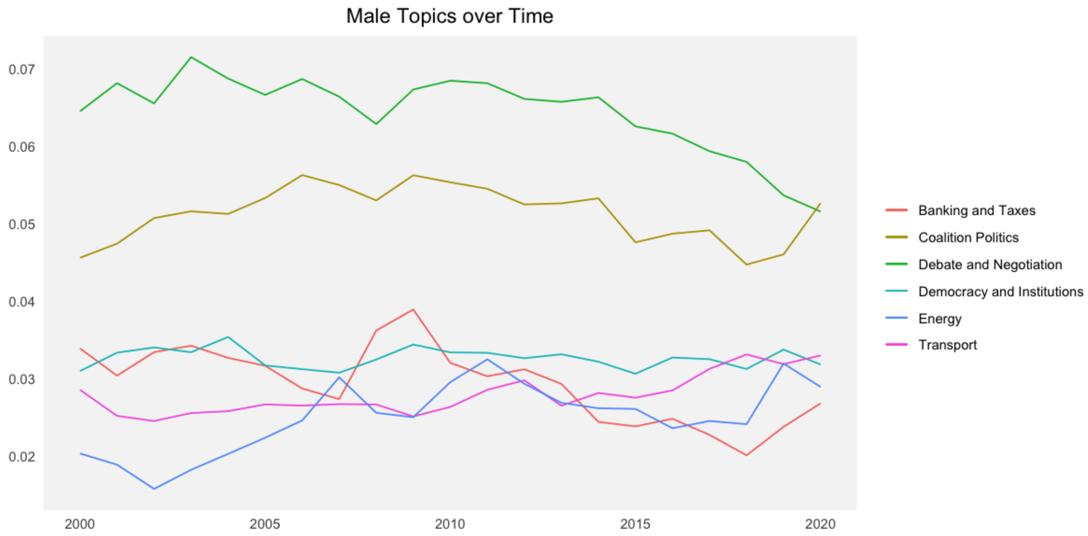


Figure A.3: Share of Top Male Topics over Time, 2000-2019

Figure A.4: Top Male and Female Topics (summed) over Time by State

D Summary Statistics

Table A.1: Summary Statistics

Statistic	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Female	0.271	0.445	0	0	1	1
Age	49.176	9.643	18	42	56	84
Length	3,390.471	3,856.541	0	588	4,879	140,519
Applause	2.287	3.527	0	0	3	148
Laughter	0.043	0.260	0	0	0	14
Cheerfulness	0.098	0.468	0	0	0	29
Interjection	1.372	3.545	0	0	1	133
Unrest	0.091	0.447	0	0	0	31
Agreement	0.073	0.468	0	0	0	38
Disagreement	0.020	0.166	0	0	0	8

Note: $N = 544,034$

E Regression Results for Topic on Gender of Speaker Regressions

Table A.2 presents the logistic regression results — namely, the estimated θ_k — for the 30 models, one per topic, regressing the gender of the speaker (1 = female) on the topic proportion estimated from the topic model, with fixed effects for state, year and party. All models have 544,034 observations.

Table A.2: Topic Labels and Top FREX Words

Topic Number	Label	θ_k
27	Debate and Negotiation	-2.96 (-3.04, -2.86)
10	Banking and Taxes	-2.73 (-2.85, -2.61)
22	Coalition Politics	-2.72 (-2.82, -2.62)
16	Democracy and Institutions	-2.34 (-2.48, -2.23)
15	Transport	-2.13 (-2.24, -2.01)
28	Energy	-1.88 (-2.00, -1.77)
7	Police, Crime and Extremism	-1.75 (-1.86, -1.63)
25	Economics	-1.24 (-1.36, -1.11)
20	Media and Information	-1.14 (-1.27, -1.02)
18	Local Government	-1.06 (-1.19, -0.93)
8	Politics in Saxony	-1.01 (-1.17, -0.85)
11	Rental Market and Housing	-0.88 (-1.00, -0.75)
23	European and Foreign Politics	-0.74 (-0.85, -0.62)
12	Investigations	-0.72 (-0.81, -0.63)
4	Environment	-0.69 (-0.80, -0.57)
6	Informal language	-0.65 (-0.75, -0.57)
29	Budget and Financial Planning	-0.43 (-0.55, -0.32)
19	Resolution and Agreement	-0.12 (-0.22, -0.02)
14	Agriculture	0.01 (-0.10, 0.12)
26	Consensus and Agreement	0.09 (-0.02, 0.19)
5	Laws and petitions	0.21 (0.11, 0.31)
30	Labor Market, Pensions and Wages	1.05 (0.94, 1.15)
24	Statistics	1.11 (0.98, 1.26)
21	Universities	1.54 (1.42, 1.65)
17	Asylum and Refugees	1.78 (1.68, 1.90)
3	Cooperation	2.19 (2.09, 2.30)
13	Healthcare	2.65 (2.55, 2.76)
1	Primary Education	3.23 (3.14, 3.31)
9	Equality and Care	5.24 (5.13, 5.35)
2	Children and Family	5.62 (5.52, 5.73)

Notes. List of all topics with labels and the gender coefficient, θ_k, ordered from topics most associated with male to those most associated with female speakers. A separate logistic regression is estimated for each of the K topics with speech ($N = 544,034$) as the unit of analysis and speaker gender (female = 1) as the dependent variable. θ_k is the logit regression coefficient on topic k's topic share estimated from the LDA model. Simulated 95% confidence intervals are provided in parentheses. In addition to the topic share variable, the models include fixed effects for state, party and year (not reported here).

Table A.3: OLS on Types of Reactions

	Dependent variable:										
	Positive	Negative	SharePos	Any	Applause	Laughter	Cheerfulness	Interjection	Unrest	Disagreement	Agreement
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Female	0.013^{*}	-0.019^{***}	0.014^{***}	-0.009^{*}	0.021^{***}	-0.004^{***}	-0.016^{***}	-0.020^{***}	0.007^{***}	-0.0005	0.001
	(0.008)	(0.006)	(0.003)	(0.005)	(0.008)	(0.001)	(0.002)	(0.006)	(0.001)	(0.0005)	(0.002)
Length	0.0001^{***}	0.0001^{***}	0.00001^{***}	0.00005^{***}	0.0001^{***}	0.00001^{***}	0.00001^{***}	0.0001^{***}	0.00001^{***}	0.00000^{***}	0.00001^{***}
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Age	-0.001^{***}	-0.0004	-0.0001	0.0002	-0.001^{***}	0.00000	0.0005^{***}	-0.0002	-0.0002^{***}	-0.00003	0.0002^{***}
	(0.0004)	(0.0003)	(0.0001)	(0.0002)	(0.0004)	(0.0001)	(0.0001)	(0.0003)	(0.0001)	(0.00002)	(0.0001)
Constant	0.394^{***}	0.413^{***}	0.669^{***}	0.540^{***}	0.421^{***}	0.019	-0.014	0.347^{***}	0.054^{**}	0.0001	-0.065^{***}
	(0.067)	(0.066)	(0.034)	(0.045)	(0.065)	(0.012)	(0.021)	(0.063)	(0.021)	(0.008)	(0.013)
Observations	544,034	544,034	397,806	544,034	544,034	544,034	544,034	544,034	544,034	544,034	544,034
R^2	0.555	0.377	0.144	0.280	0.554	0.065	0.124	0.378	0.085	0.030	0.243

Note: *p<0.1; **p<0.05; ***p<0.01 All models include fixed effects for party, year, state, and topic. Standard errors are robust, clustered on MP.

F Gender Incongruity Model

Table A.4: Interaction Models: Gender of Speaker Interacted with Predicted Gender of Speech

	Dependent variable:										
	Applause	Interjection	Laughter	Cheerfulness	Unrest	Disagreement	Agreement	Positive	Negative	SharePos	Any
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Female	0.059***	0.030***	0.0004	−0.011***	0.012***	0.001***	0.001	0.052***	0.034***	0.008**	0.012**
	(0.008)	(0.007)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.008)	(0.007)	(0.003)	(0.006)
Predicted Gender	−0.105***	−0.165***	−0.016***	−0.022***	−0.017***	−0.006***	0.002**	−0.110***	−0.175***	0.024***	−0.058***
	(0.005)	(0.004)	(0.001)	(0.001)	(0.001)	(0.0004)	(0.001)	(0.005)	(0.005)	(0.001)	(0.003)
Length	0.0001***	0.0001***	0.00001***	0.00001***	0.00001***	0.00000***	0.00001***	0.0001***	0.0001***	0.00001***	0.00005***
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Age	−0.002***	−0.001*	−0.00004	0.0004***	−0.0002***	−0.00004*	0.0002***	−0.001***	−0.001**	−0.0001	0.00002
	(0.0004)	(0.0003)	(0.0001)	(0.0001)	(0.0001)	(0.00003)	(0.0001)	(0.0004)	(0.0003)	(0.0001)	(0.0002)
Executive	−0.221***	−0.171***	−0.016***	−0.019***	−0.021***	−0.009***	−0.008***	−0.226***	−0.186***	−0.003	−0.131***
	(0.014)	(0.012)	(0.002)	(0.004)	(0.003)	(0.001)	(0.003)	(0.014)	(0.012)	(0.006)	(0.009)
Total Speech Length	−0.00000***	0.00000***	0.000***	−0.000	0.000**	0.000***	−0.000***	−0.00000***	0.00000***	−0.00000***	−0.00000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Female × Predicted Gender	0.092***	0.064***	0.006***	0.009***	0.007***	0.002***	0.0001	0.096***	0.070***	0.002	0.060***
	(0.007)	(0.007)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.007)	(0.007)	(0.002)	(0.004)
Constant	0.268***	0.230***	0.017	−0.007	0.053**	−0.005	−0.070***	0.241***	0.291***	0.651***	0.468***
	(0.064)	(0.063)	(0.012)	(0.021)	(0.021)	(0.008)	(0.012)	(0.066)	(0.065)	(0.034)	(0.045)
Observations	544,034	544,034	544,034	544,034	544,034	544,034	544,034	544,034	544,034	397,806	544,034
R^2	0.535	0.371	0.060	0.118	0.080	0.027	0.243	0.535	0.368	0.129	0.243

Note: *p<0.1; **p<0.05; ***p<0.01 All models include fixed effects for party, year, state, and topic. Standard errors are robust, clustered on MP.

G Robustness Checks

In this section, we discuss the various additional models that we have run as robustness checks and we present results from the two most important of those specifications. First, we present results from the interaction models with the share of female MPs in parliament. We include *female share* as a simple control variable here. We have also run models with a triple interaction of speaker gender, gender of speech and the share of females in parliament. Our results are unaffected by including the female share variable as part of the interaction. We do not report this model here due to the difficulty of presenting and interpreting triple interactions.

Second, we have run models with state-party effects. These models help to capture the fact that different parties have different numbers of women MPs across different states. Some parties in some states may also be better or worse at covering women's topics. Again, we find that the results from these models are nearly identical to the main models in the paper.

In addition to these models, we have also performed negative binomial regressions because our dependent variables are (primarily) count variables. The results are substantively similar, and we present the simpler, less computationally intensive, OLS models.

Finally, we have run models where we split the data into male and female MPs, drop the MP-level covariates and replace them with MP fixed-effects, using robust standard errors clustered on MP. Because these are within MP results, this specification is the most conservative possible. The results are the substantively the same as those presented in the paper.

Table A.5: Models with State-Party Fixed Effects

	Dependent variable:										
	Applause	Interjection	Laughter	Cheerfulness	Unrest	Disagreement	Agreement	Positive	Negative	SharePos	Any
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Female	0.053^{***}	0.029^{***}	0.0003	-0.011^{***}	0.012^{***}	0.001^{***}	0.001	0.046^{***}	0.034^{***}	0.005^{*}	0.008
	(0.007)	(0.006)	(0.001)	(0.002)	(0.001)	(0.0005)	(0.002)	(0.007)	(0.006)	(0.003)	(0.005)
Predicted Gender	-0.105^{***}	-0.166^{***}	-0.016^{***}	-0.022^{***}	-0.017^{***}	-0.006^{***}	0.002^{**}	-0.110^{***}	-0.176^{***}	0.024^{***}	-0.058^{***}
	(0.005)	(0.004)	(0.001)	(0.001)	(0.001)	(0.0004)	(0.001)	(0.005)	(0.005)	(0.001)	(0.003)
Length	0.0001^{***}	0.0001^{***}	0.00001^{***}	0.00001^{***}	0.00001^{***}	0.00000^{***}	0.00001^{***}	0.0001^{***}	0.0001^{***}	0.00001^{***}	0.00005^{***}
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Total Speech Length	-0.00000^{***}	0.00000^{***}	0.000^{***}	-0.000	0.000	0.000^{***}	-0.000^{***}	-0.00000^{***}	0.00000^{***}	-0.00000^{***}	-0.00000^{***}
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Age	-0.002^{***}	-0.001^{**}	-0.00003	0.0004^{***}	-0.0002^{***}	-0.00004	0.0001^{*}	-0.002^{***}	-0.001^{**}	-0.0002	-0.0001
	(0.0003)	(0.0003)	(0.00005)	(0.0001)	(0.0001)	(0.00002)	(0.0001)	(0.0003)	(0.0003)	(0.0001)	(0.0002)
Executive	-0.206^{***}	-0.168^{***}	-0.019^{***}	-0.019^{***}	-0.020^{***}	-0.010^{***}	-0.007^{**}	-0.212^{***}	-0.184^{***}	-0.001	-0.132^{***}
	(0.013)	(0.012)	(0.002)	(0.004)	(0.003)	(0.001)	(0.003)	(0.013)	(0.012)	(0.006)	(0.009)
Female × Predicted Gender	0.094^{***}	0.064^{***}	0.006^{***}	0.009^{***}	0.007^{***}	0.002^{***}	0.0001	0.098^{***}	0.070^{***}	0.002	0.061^{***}
	(0.007)	(0.006)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.007)	(0.007)	(0.002)	(0.004)
Constant	0.210^{***}	0.425^{***}	0.035^{**}	-0.030	0.034^{*}	0.003	-0.035^{***}	0.207^{***}	0.491^{***}	0.576^{***}	0.618^{***}
	(0.069)	(0.117)	(0.014)	(0.021)	(0.020)	(0.009)	(0.009)	(0.070)	(0.115)	(0.048)	(0.048)
Observations	544,034	544,034	544,034	544,034	544,034	544,034	544,034	544,034	544,034	397,806	544,034
R^2	0.544	0.374	0.064	0.120	0.082	0.027	0.251	0.544	0.372	0.143	0.251

Note: $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$ All models include fixed effects for State-Party, year and topic. Standard errors are robust, clustered on MP.

Table A.6: Models with State-Period Fixed Effects

	Dependent variable:										
	Applause	Interjection	Laughter	Cheerfulness	Unrest	Disagreement	Agreement	Positive	Negative	SharePos	Any
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Female	0.058^{***}	0.028^{***}	0.0004	-0.011^{***}	0.012^{***}	0.001^{**}	0.002	0.052^{***}	0.033^{***}	0.008^{***}	0.010^{*}
	(0.008)	(0.006)	(0.001)	(0.002)	(0.001)	(0.0005)	(0.002)	(0.008)	(0.007)	(0.003)	(0.005)
Predicted Gender	-0.104^{***}	-0.162^{***}	-0.016^{***}	-0.022^{***}	-0.017^{***}	-0.006^{***}	0.002^{**}	-0.110^{***}	-0.173^{***}	0.023^{***}	-0.057^{***}
	(0.004)	(0.004)	(0.001)	(0.001)	(0.001)	(0.0004)	(0.001)	(0.004)	(0.005)	(0.001)	(0.003)
Length	0.0001^{***}	0.0001^{***}	0.00001^{***}	0.00001^{***}	0.00001^{***}	0.00000^{***}	0.00001^{***}	0.0001^{***}	0.0001^{***}	0.00001^{***}	0.00005^{***}
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Total Speech Length	-0.00000^{***}	0.00000^{***}	0.000^{***}	0.000	0.000^{***}	0.000^{***}	-0.000^{***}	-0.00000^{***}	0.00000^{***}	-0.00000^{***}	-0.00000^{***}
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Age	-0.002^{***}	-0.001^{*}	-0.00004	0.0005^{***}	-0.0002^{***}	-0.0001^{**}	0.0002^{***}	-0.001^{***}	-0.001^{**}	-0.0001	-0.00005
	(0.0004)	(0.0003)	(0.0001)	(0.0001)	(0.0001)	(0.00002)	(0.0001)	(0.0004)	(0.0003)	(0.0001)	(0.0002)
Executive	-0.213^{***}	-0.169^{***}	-0.016^{***}	-0.020^{***}	-0.021^{***}	-0.009^{***}	-0.006^{***}	-0.218^{***}	-0.184^{***}	-0.004	-0.125^{***}
	(0.012)	(0.011)	(0.002)	(0.003)	(0.003)	(0.001)	(0.002)	(0.012)	(0.012)	(0.005)	(0.009)
Female × Predicted Gender	0.091^{***}	0.062^{***}	0.006^{***}	0.008^{***}	0.007^{***}	0.002^{***}	-0.00003	0.094^{***}	0.068^{***}	0.001	0.059^{***}
	(0.007)	(0.006)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.007)	(0.007)	(0.002)	(0.004)
Constant	0.351^{***}	0.127^{***}	0.024^{***}	-0.003	0.065^{***}	0.011^{***}	-0.029^{***}	0.334^{***}	0.200^{***}	0.748^{***}	0.528^{***}
	(0.031)	(0.028)	(0.005)	(0.008)	(0.008)	(0.002)	(0.007)	(0.032)	(0.030)	(0.015)	(0.019)
Observations	544,034	544,034	544,034	544,034	544,034	544,034	544,034	544,034	544,034	397,806	544,034
R^2	0.544	0.382	0.064	0.124	0.084	0.028	0.254	0.544	0.378	0.148	0.250

Note: *p<0.1; **p<0.05; ***p<0.01 All models include fixed effects for party, state-period, and topic. Standard errors are robust, clustered on MP.

Table A.7: Regressions with Share Female instead of Year

	Dependent variable:										
	Applause	Interjection	Laughter	Cheerfulness	Unrest	Disagreement	Agreement	Positive	Negative	SharePos	Any
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Female	0.056***	0.031***	0.001	−0.011***	0.011***	0.001***	0.001	0.049***	0.035***	0.006*	0.010*
	(0.009)	(0.007)	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)	(0.009)	(0.007)	(0.003)	(0.006)
Predicted Gender	−0.104***	−0.167***	−0.016***	−0.022***	−0.017***	−0.006***	0.002**	−0.109***	−0.177***	0.025***	−0.057***
	(0.005)	(0.005)	(0.001)	(0.001)	(0.001)	(0.0004)	(0.001)	(0.005)	(0.005)	(0.001)	(0.003)
Length	0.0001***	0.0001***	0.00001***	0.00001***	0.00001***	0.00000***	0.00001***	0.0001***	0.0001***	0.00001***	0.00005***
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Age	−0.002***	−0.001**	−0.00003	0.0004***	−0.0002***	−0.0001**	0.0002***	−0.001***	−0.001***	−0.00001	0.0002
	(0.0004)	(0.0003)	(0.0001)	(0.0001)	(0.0001)	(0.00003)	(0.0001)	(0.0004)	(0.0003)	(0.0001)	(0.0002)
Executive	−0.223***	−0.164***	−0.016***	−0.018***	−0.021***	−0.009***	−0.009***	−0.229***	−0.179***	−0.006	−0.132***
	(0.014)	(0.013)	(0.002)	(0.004)	(0.003)	(0.001)	(0.003)	(0.014)	(0.013)	(0.007)	(0.009)
female share	0.436***	−0.081	−0.037***	0.059***	−0.002	0.001	−0.017	0.460***	−0.106	0.173***	0.299***
	(0.074)	(0.070)	(0.010)	(0.022)	(0.024)	(0.005)	(0.013)	(0.073)	(0.073)	(0.036)	(0.050)
Total Speech Length	−0.00000***	0.00000**	0.000***	−0.000	0.000*	0.000***	−0.000***	−0.00000***	0.00000**	−0.00000***	−0.00000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Female × Predicted Gender	0.092***	0.064***	0.006***	0.009***	0.007***	0.002***	0.0001	0.096***	0.070***	0.001	0.060***
	(0.007)	(0.007)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.007)	(0.007)	(0.002)	(0.004)
Constant	0.328***	0.304***	0.046***	−0.035***	0.014	0.003	−0.056***	0.281***	0.351***	0.672***	0.511***
	(0.045)	(0.044)	(0.006)	(0.011)	(0.012)	(0.003)	(0.012)	(0.045)	(0.046)	(0.023)	(0.029)
Observations	544,034	544,034	544,034	544,034	544,034	544,034	544,034	544,034	544,034	397,806	544,034
R^2	0.532	0.366	0.060	0.116	0.079	0.026	0.241	0.533	0.364	0.120	0.240

Note: *p<0.1; **p<0.05; ***p<0.01 All models include fixed effects for party, state, and topic. Standard errors are robust, clustered on MP.