

# **Do Women Politicians Face More Interruptions? An Analysis of Interjections in the Australian Parliamentary Debates (1998-2025)**

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While interruptions are a natural component of parliamentary debate, they also reveal information about politicians' behaviour and power dynamics within political institutions. In this paper, we use a comprehensive dataset of digitized Australian Hansard transcripts from 1998 to 2025 to examine the content and nature of interruptions in parliamentary proceedings, with a focus on gender. Our exploratory analysis shows differences in the frequency of interruptions made towards men and women politicians, and how that has changed over time. This study contributes new empirical evidence to the study of gender and legislative speech, demonstrating the value of computational methods for uncovering how subtle forms of discursive inequality reinforce power dynamics.

## **Introduction**

Women are increasingly being elected to parliaments around the world, including in Australia. Despite gains in numerical representation, women remain underrepresented in a substantive sense, because their ability to influence political debates and shape policy outcomes is often constrained. Pitkin (1967) distinguishes between these two forms of representation as *descriptive* and *substantive*. Descriptive representation refers to the presence of women in elected office, while substantive representation involves speaking and acting on behalf of women's interests, including introducing legislation, engaging in debates, or undertaking advocacy efforts (Rayment and McCallion 2024).

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However, increases in women's descriptive representation do not automatically lead to stronger substantive representation. Feminist institutionalist scholars argue that political institutions are gendered in ways that constrain women's political influence (Tremblay 2003; Sawer 2012; Kenny 2014). Formal and informal rules, norms, and hierarchies within institutions can subtly, yet powerfully limit women's ability to engage in substantive representation. One such behaviour is the use of interruptions during parliamentary proceedings. Interruptions are defined as "intrusions into the current speaker's turn" (Kollock, Blumstein, and Schwartz 1985, 38). Although interruptions are a routine and institutionally sanctioned feature of parliamentary debate, they can be employed particularly by men politicians to assert dominance, undermine, or silence women politicians (Vallejo Vera and Gómez Vidal 2022). As Och (2020) argues, such interruptions can be a form of resistance to women's substantive representation, reinforcing gendered power dynamics within parliament.

Following Celis et al.'s (2008, 99) calls to rethink substantive representation along the lines of "where, how, and why" does it occur, this paper emphasizes the "who" and "how." Specifically, we examine who is interrupted, focusing on the gender and political party affiliation of the Members of Parliament (MPs) and how interruptions operate as a gendered constraint on substantive representation in the Australian House of Representatives. Our paper asks: do women MPs get interrupted more than men MPs? Does political party affiliation shape which MPs get interrupted the most?

To answer these questions, we analyze a comprehensive dataset of digitized Hansard transcripts from the 38th to 47th parliaments (March 1998 to July 2025) (Katz and Alexander 2025). Through quantitative analysis of parliamentary debates and Question Time (QT), we examine the frequency and nature of interruptions along gendered and party lines. Our findings reveal that women MPs from centre and centre-left leaning political parties are interrupted more frequently than men MPs.

This paper contributes to a small, but growing body of quantitative research analyzing the substantive representation of women in Australian politics (Vacaflorres and Stephenson 2025; Dijk and Poljak 2025). By combining feminist institutional analysis with quantitative methods, we reveal how institutional constraints like interruptions undermine women's substantive representation.

This paper proceeds as follows. We begin by outlining our theoretical frameworks, including women's substantive representation, feminist institutionalism, and gendered parliamentary discourse. We then discuss our data and methodology, followed by analysis of our results. Lastly, we conclude by summarizing our main findings, highlighting our contributions, and suggesting areas for future research.

## **Literature Review**

### **Substantive Representation**

Substantive representation can be conceived as how elected representatives' actions align with the needs and wishes of their constituents (Pitkin 1967). Women politicians are often considered to be best positioned to represent the interests and needs of women, by raising policy issues of importance to women and/or by bringing women's perspectives to policy issues often considered more masculine, such as the economy. Krook and O'Brien (2012) define and categorize the gendered nature of cabinet positions, suggesting that policy issues such as healthcare, social welfare, and gender equality are "women's issues," while more masculine-coded policy issues include the economy, defence, and foreign affairs. Neutral issues could include the environment, public works, and the civil service (Krook and O'Brien 2012). These categorizations are useful for understanding substantive representation, but remain contested, given different parliamentary contexts and as understanding of gender moves beyond a binary framework.

Substantive representation in practice can take a number of forms in parliamentary contexts, including introducing legislation, engaging in debates, asking questions during QT, participating in committee meetings, or undertaking advocacy efforts (Rayment and McCallion 2024; Childs and Krook 2009). However, routine parliamentary rules and procedures, such as interruptions and adversarial behaviour, can be mobilized to either contribute to or undermine women's substantive representation (Vallejo Vera and Gómez Vidal 2022). For example, Vacaflores and Stephenson (2025) focuses on studying private members' bills in the Australian House of Representatives, where party discipline is less likely to permeate the nature of issues raised. They find that gender and legislators' individual backgrounds inform the types of issues addressed. In parliamentary speeches on bills, women politicians are more likely to speak to bills explicitly related to women's issues (Hargrave and Langengen 2021; Bäck and Debus 2019), or provide a gendered lens even if the legislation does not specifically address issues traditionally characterized as "women's issues" (Rayment 2024; Vacaflores and Stephenson 2025).

Defining "women's issues" remains a key concern to scholars studying substantive representation. "Women's issues" have never been fixed or universally agreed upon, especially as contemporary understandings of gender move beyond a binary framework. Vacaflores and Stephenson (2025) suggests a solution to this by viewing policy issues along a spectrum of "feminized" and "masculinized" issues. This approach allows for a more flexible understanding of what counts as "women's issues" and who can represent women. Men politicians can also undertake the substantive representation of women (Rayment and McCallion 2024) and issues not traditionally characterized as "women's issue" still hold gendered implications (Bird 2005). Nevertheless, issues such as gender-based violence, childcare, healthcare, social welfare, and education continue to be widely viewed as "women's issues" (Rayment 2024; Krook and O'Brien 2012).

Who raises these issues, and how they are framed in parliamentary speeches, is shaped by political party affiliation, ideology, and party discipline (Rayment 2024; Och 2020; Tremblay 2003). In the Canadian parliament, Rayment (2024) illustrates that Conservative women MPs are more likely than Liberal and New Democratic Party (NDP) MPs to speak about “women’s issues” between 1968 and 2015. However, Conservative MPs often focus on these issues through a traditional values lens, while Liberal and NDP MPs discuss these issues from a pro-gender equality perspective. This highlights that speaking and acting for women as part of substantive representation cannot be thought of in monolithic terms - party affiliation, ideology, and gender intersect, shaping how substantive representation occurs. Och (2020) illustrates that in the German Bundestag, men MPs from right-leaning political parties were more likely to interrupt women MPs from centre and centre-left political parties regardless of the policy issues being discussed. This behaviour acts as a form of backlash to both their numerical presence and substantive contributions in parliament.

In Australia, scholars have documented that progressive parties such as the Australian Labor Party (ALP) and the Greens have more consistently supported gender equity measures and addressed “women’s issues,” compared to right-leaning parties such as the Liberal Party of Australia (Vacafloros and Stephenson 2025). However, women politicians have also worked across party lines to advance “women’s issues,” such as the successful effort to lift the ministerial veto on the importation of the abortion pill RU486 (Sawer 2012). This example demonstrates that while party affiliation and ideology can shape how substantive representation occurs, gender can, at times, exert stronger influence. Responses to legislation on domestic violence, paid parental leave, and the gender pay gap further reveal how different parties and MPs conceptualize and engage with “women’s issues.” This engagement, however, does not take place in isolation, as broader institutional norms and rules shape how MPs can speak and act on behalf of women’s interests. These cultural and institutional conditions will be discussed further in the following section.

## **Parliamentary Culture and Gender**

Parliamentary culture and broader institutional norms play a critical role in shaping the conditions under which women MPs can speak and act on behalf of women’s interests, despite being framed as “neutral” institutions (Collier and Raney 2018). This culture reflects and reproduces social hierarchies and power imbalances, rooted in gender, which intersect with race, sexuality, and class to shape political outcomes (Chappell and Waylen 2013). In Westminster parliaments, including the Australian House of Representatives, parliamentary culture has historically been shaped by masculine norms and values, while constraining marginalized voices (Mackay, Kenny, and Chappell 2010; Crawford and Pini 2011). Julia Gillard’s 2012 sexism and misogyny speech drew global attention to these dynamics, highlighting how women politicians face a double bind as they “...negotiate the demand to demonstrate masculine leadership attributes without tarnishing the feminine qualities expected of them (Wright and Holland 2014, 455; Sawer 2013). Underpinning parliamentary behaviour and interactions, this culture

shapes legislative debates, including interruptions, which can serve to reinforce gendered hierarchies and further marginalize women MPs. Understanding these gendered dimensions of parliamentary culture is important for understanding how interruptions can constrain women's substantive representation.

Feminist institutionalism provides a valuable framework for analyzing gendered dynamics within parliamentary settings, drawing attention to the interaction between formal rules such as the Standing Orders and parliamentary privilege and informal rules and cultural norms (Kenny 2014; Chappell and Waylen 2013; Mackay, Kenny, and Chappell 2010). While formal parliamentary rules are designed to guarantee equality, informal norms often shape behaviours differently. For example, Standing Orders are intended to give women and men politicians equal speaking time, but in practice, men are more likely to interrupt women politicians. Dowding, Leslie, and Taflaga (2021) highlights how in the Australian House of Representatives, speaking time is allocated by ministerial status, seniority, and gender, with women and less experienced MPs speaking less often despite the Standing Orders allocating equal floor time for all MPs. Consequently, women politicians may plan to give shorter speeches when they get floor time out of concern of being interrupted or abandon giving their speech entirely after being interrupted multiple times (Vallejo Vera and Gómez Vidal 2022).

Hames, Haugh, and Musgrave (2025) highlights that certain forms of unparliamentary language are enshrined in the Standing Orders, while other language around discussions of social issues like racism rely on case-by-case rulings by Speakers. This ambiguity and lack of codified rules could further undermine women and racialized politicians attempting to speak on behalf of marginalized groups. As Ilie (2010) argues, parliamentary discourse can be inherently strategic, structured by turn-taking, interruptions, and framing that reflect broader power hierarchies. These communicative practices are not neutral as they often amplify dominant voices and reinforce a speaker's power while aiming to undermine their opponent (Ilie 2013). Furthermore, mechanisms like parliamentary privilege, which protect MPs from the legal consequences of free speech in the chamber, can help them avoid accountability on incivility and harassment, which disproportionately affect women MPs (Collier and Raney 2018; Sawer 2013). Feminist institutionalism therefore directs attention toward the "hidden" ways in which gender continues to shape participation, authority, and legitimacy within political institutions (Chappell and Waylen 2013).

## **Interruptions and Gender**

Prior studies analyzing the gendered nature of interruptions in parliamentary debates and committee meetings globally show mixed results. Interruptions can be understood as more than a procedural tactic, as they can also be a form of violence against women in politics (VAWIP). Krook (2022) considers this "semiotic violence," where language, symbols, interruptions, and other discursive strategies are mobilized to undermine women politicians' authority and presence. This highlights how interruptions are not always spontaneous and can be strategically employed to reproduce gendered hierarchies in parliament. At the same time, interruptions

can be shaped by institutional and strategic factors. Diener (2025) shows how high status, policy expertise, and whether MPs are in opposition shape how they use interruptions as a form of political communication to strategically discredit other members and raise their own profile.

Within this broader conceptualization, empirical findings vary across parliaments. In the German Bundestag, Och (2020) found that women MPs are more likely to be interrupted than men, but argues that these interruptions are not a form of semiotic VAWIP because women MPs learned to utilize interruptions to further their own goals. Similarly, Stopfner (2018) employed qualitative case studies to understand whether gendered heckling is shaped by specific parliamentary contexts or reflects broader parliamentary culture. She concludes that both institutional norms and transnational parliamentary cultures contribute to the gendered interruptions that undermine women's process-oriented substantive representation (Rayment 2024).

In contrast, evidence from the Ecuadorian Congress presents a more nuanced picture. Vallejo Vera and Gómez Vidal (2022) found that while women Members of Congress (MCs) were less likely to be interrupted than men, interruptions silenced women at a higher rate. However, they found that higher status and promotion to more prominent legislative roles could reverse some of the most negative effects of interruptions for women MCs.

In the Canadian House of Commons, Whyte (2017) found that gendered interruptions sharply increased during the 1990s, coinciding with an increase in the descriptive representation of women. Yet, Dijk and Poljak (2025)'s analysis of parliamentary speeches in the UK, Australia, and Croatia finds no gender difference in whether individual politicians get interrupted and that all politicians are less likely to be interrupted when more women participate in debates. Notably, they find that in Australia, the number of interruptions declined as the number of women serving in parliament increased.

Research focused on committee meetings further illustrates the gendered nature of interruptions. In the Australian Senate Estimate hearings between 2006 and 2015, Richards (2016) finds that men senators used interruptions to block other speakers or assert control over the floor, with women senators and witnesses receiving the most negative interruptions. Likewise, in US state legislatures, Kathlene (1994) shows that as the number of women increases in committee hearings, men legislators responded with more interruptions and verbal aggression aimed at undermining women's substantive participation in the policymaking process. Additionally, Miller and Sutherland found that women senators faced twice as many interruptions from male colleagues when speaking about "women's issues," with men senators employing an aggressive form of interruptions called "rapid-fire 'interruption clusters'" to undermine and disrupt their speeches (2023, 103).

Taken together, these studies of both parliamentary debates and committee meetings emphasize that even as the number of women elected increases, women politicians are often interrupted more frequently by male colleagues. This pattern largely holds across nations and institutional contexts, highlighting that interruptions undermine women politicians' abilities

to speak and act on behalf of women. By focusing on interruptions in the Australian House of Representatives from 1998 to 2025, our paper contributes to the literature by combining feminist institutionalism with quantitative methods to examine how interruptions function as a persistent, gendered constraint on women's substantive representation in parliament.

## Data and Methods

### Dataset Overview

To perform this analysis, we use the digitized Australian Hansard corpus produced by Katz and Alexander (2023). This dataset captures all parliamentary proceedings in the House of Representatives from March 1998 to July 2025. As outlined in Katz and Alexander (2023), the dataset was generated using the XML transcripts available on the Parliament of Australia website. The parsed XML transcripts were reshaped, cleaned, enhanced, and validated using a combination of manual and automated tests, as well as external datasets available in the `AustralianPoliticians` and `ausPH` R packages (Alexander and Hodgetts 2021; Leslie 2024).

The complete corpus contains a total of 647,852 rows, where each row represents an individual statement, with details on who is speaking. The earliest sitting day captured is 2 March 1998, and the most recent sitting day captured is 31 July 2025. For completeness, we choose to limit the dataset so that only complete parliamentary periods are captured. As a result, the earliest date is the first sitting day from parliament number 39 (10 November 1998), and the latest date is the final sitting day from parliament number 47 (27 March 2025). The cutoff dates used for each parliamentary period are available in the Appendix, in Table 10.

The use of data spanning multiple parliamentary periods allows us to explore patterns over time, which is of particular interest as the descriptive representation of women in the House of Representatives increased from 21.6 percent in 1998 to 44.5 percent in 2022 (Australian Bureau of Statistics 2025; International Foundation for Electoral Systems (IFES) 1998). This period also includes important political milestones, such as Julia Gillard's tenure as Australia's first woman Prime Minister (2010 to 2013), including her 2012 sexism and misogyny speech, which drew attention to the gendered nature of Australian politics (Sawer 2013).

While this dataset contains proceedings from both the Chamber and the Federation Chamber, for the purpose of this analysis, we filter the corpus to only include Chamber proceedings. This filtering out of Federation Chamber proceedings, alongside the filtering to only include sitting days from parliaments 39 to 47, results in a row count of 535,961. Choosing to exclude rows from the Federation Chamber is motivated largely by 1) not every sitting day has Federation Chamber proceedings, 2) these proceedings are often significantly shorter than the Chamber proceedings, and 3) the topics discussed in the Federation Chamber are restricted (Representatives et al. 2018). As such, interjection data is far more sparse in the Federation Chamber proceedings, making it less suitable for this project.

name	order	speech_no	partyName	body	gender	interject
Mitchell, Rob	230	109	Australian Labor Party	It's been interesting to listen to the whingeing and the...	male	0
Conaghan, Pat	231	109	The Nationals	Mr Conaghan interjecting-	male	1
Claydon, Sharon (The DEPUTY SPEAKER)	232	109	Australian Labor Party	Okay, enough! Order! It is really disorderly to do that....	female	0
Mitchell, Rob	233	109	Australian Labor Party	It's disgusting to think that those opposite said to the...	male	0
McCormack, Michael	234	109	The Nationals	No, it was me.	male	1
Mitchell, Rob	235	109	Australian Labor Party	It was you? Well, that explains it-to actually go there,...	male	0
The DEPUTY SPEAKER	236	109	NA	Member for McEwen, I didn't understand the reference, but you...	NA	0
Mitchell, Rob	237	109	Australian Labor Party	The minister who was caught rorting was Bridget McKenzie, the...	male	0
The DEPUTY SPEAKER	238	109	NA	Member for McEwen, you need to withdraw the allegation.	NA	0
Mitchell, Rob	239	109	Australian Labor Party	I withdraw. It's quite simple. Those opposite cut funding to...	male	0

Table 1: 10 rows of 27 March 2025 proceedings from the Hansard corpus published by Katz and Alexander (2025)

Name	Description
name	Name of the individual speaking as parsed from the Hansard XML
order	Row number
speech_no	Index of each speech made on the given sitting day, which includes all statements and interruptions
partyName	Speaking member's party name
body	Statement text
gender	Gender of the speaker
interject	Interjection flag

Table 2: Description of variables in Table 1. Note: this does not include all variables that are available in the corpus.

Table 1 contains all rows of speech number 109 from the Hansard proceedings on 27 March 2025, followed by a table defining each variable as outlined in Katz and Alexander (2023). By looking at the first individual who makes a statement in that speech (i.e., the name associated with the minimum order number), we can identify the person whose turn it is to speak, which in Table 1 is Rob Mitchell. Therefore, any statements made by members within that speech that are not attributed to Rob Mitchell (the member whose turn it is to speak), the Speaker, or the Deputy Speaker, are flagged as interjections in the `interject` column (Katz and Alexander 2023).

The value for gender was assigned only for rows with an individual MP's name in the `name` column. Rows with body text containing a business start or stage direction are attributed as such, and cannot be assigned a gender. Also, there are over 18,000 rows in the corpus attributed to one or multiple opposition members, government members, or honourable members, where no gender can be assigned. Other examples of statements which cannot be assigned a gender include those made by The Speaker, The Deputy Speaker, or The Acting Speaker. In all of

Parliament Number	Count
39	217
40	189
41	196
42	173
43	179
44	190
45	166
46	170
47	171

Table 3: Number of sitting days per parliament

these cases, the gender value is left as missing.

## Summary Statistics

Generating a variety of summary metrics and visualizations allows for a better understanding of the data at hand. In the filtered corpus which will be used for our analysis, there are a total of 1651 sitting days, with 391 unique speakers, 12 unique parties, and 170 unique electorates identified. A summary of the number of sitting days per parliament is provided in Table 3. On average, there are 183 sitting days per parliament.

In the filtered dataset, the number of unique speakers per day ranges from 1 to 116, with a mean and standard deviation of about 76 and 13, respectively. The number of speakers per day disaggregated by gender is illustrated in Figure 1. Based on this plot it is clear that since 1998, the number of women speakers has overall been smaller than the number of men speakers. However, this gender gap appears to be narrowing over time, indicating an improvement in the representation and inclusion of women politicians from 1998 to now.

Of the 535,961 rows in this dataset, 95,522 are flagged as interjections, which amounts to about 18% of the total row count. The distribution of interjections by gender is summarized in Table 4. The proportion of interjections made by men speakers is 52.93% higher than that of women speakers. Also, 19.16% of flagged interjections are associated with speakers without a specified gender (NA), most frequently attributed to “Opposition members,” “Honourable members,” or “Government members.”

Figure 2 illustrates the daily number of flagged interjections per speaker in parliament, with separate smoothed trend lines for men and women, accounting for differences in the number of men and women speakers present each day. Based on the smoothed trend lines, it appears that the daily rate of interjections for women MPs is generally lower than that of men MPs across sitting days. Despite an increase in the number of women MPs present over time as depicted

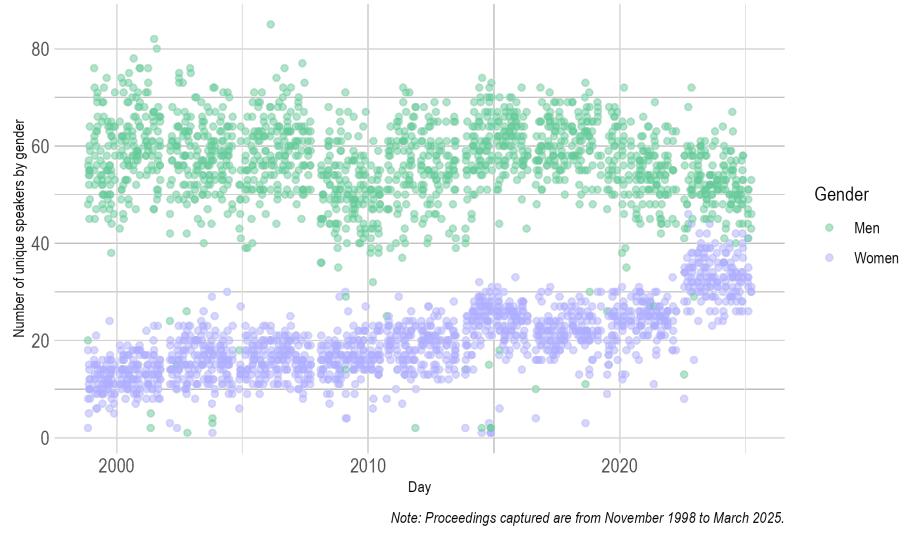


Figure 1: Number of unique speakers per day by gender

Gender	Count	Proportion
Female	13332	13.96%
Male	63891	66.89%
NA	18299	19.16%

Table 4: Count and proportion of interjections by gender. Note: statements that were not made by an individual MP such as ‘Government members interjecting-’ could not be assigned a value for gender, resulting in a value of NA.

in Figure 1, the daily rate of interjections being made by women MPs does not appear to have increased as a result.

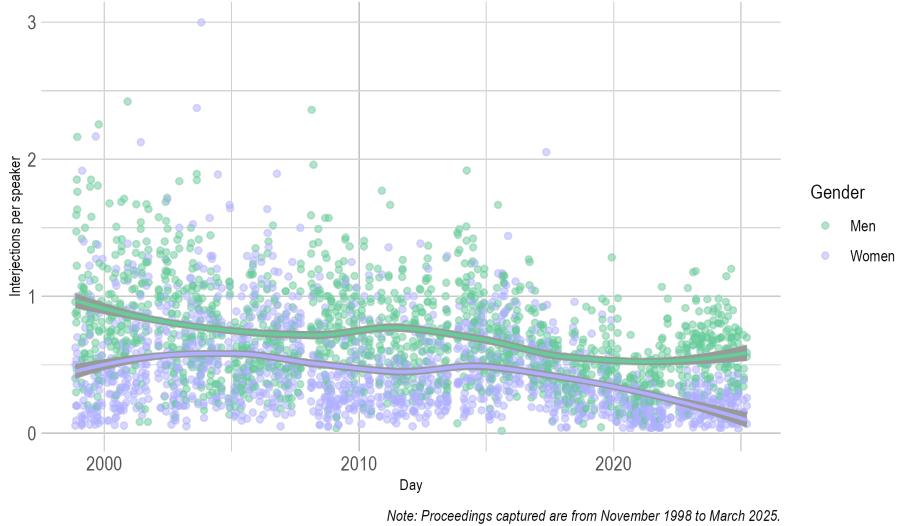


Figure 2: Daily rate of interjections by gender

Table 5 provides an overview of the interjections flagged by gender and political party. The values in the table capture the rate of interjections per MP for each gender and party. This rate is equal to the total number of interjections divided by the total number of unique MPs for the given gender and party. The percentages in parentheses represent the total share of interjections by gender in that party. For 5 of the 6 parties with both men and women MPs, the rate and share of interjections for men is notably higher than those of women.

Finally, Table 6 contains key metrics relating to the length of speeches in the corpus. Evidently, the range of speech length is quite large, spanning from 1 word to 117,296 words. Examples of speeches with very small word counts are stage directions such as “Bill presented by Mr Tollner.” (on 16 June 2003), or one-word answers to questions in writing such as “Yes” or “No.” The average word count per speech across the entire corpus is about 639, with a standard deviation of about 1080 words.

Party Name	Women	Men
Australian Greens	7.33 (7.4%)	55 (92.6%)
Australian Labor Party	121.95 (21.3%)	307.8 (78.7%)
Centre Alliance	24 (100%)	0 (0%)
Country Liberal Party (Northern Territory)	69 (84.1%)	13 (15.9%)
Independent	19.33 (24.4%)	71.8 (75.6%)
Katters Australian Party	0 (0%)	347 (100%)
Liberal Party of Australia	87.67 (12.3%)	180.41 (87.7%)
National Party of Australia (WA)	0 (0%)	4 (100%)
Nationalist Party	0 (0%)	275 (100%)
Nick Xenophon Team	11 (100%)	0 (0%)
Palmer United Party	0 (0%)	1 (100%)
The Nationals	41.25 (5%)	91.79 (95%)

Table 5: Interjections per MP by gender and party, with share of total interjections in parentheses

Metric	Value
Average	639.42
Minimum	1.00
Maximum	117296.00
Standard Deviation	1080.18

Table 6: Average, standard deviation, minimum and maximum number of words per speech

## Statistical Model and Data Preparation

### Model Overview

The aim of this project is to explore how a given MP's gender and political party impact the frequency of interruptions made toward them while it is their turn to speak. A Negative Binomial model will be used to perform this analysis, where the outcome  $\mu_i$  represents the expected count of interruptions made toward an individual MP ( $i$ ) within a given parliament.

This model was chosen largely because it is well suited for modeling count outcome variables, such as the number of interjections. While a Poisson model is also suitable for count outcomes, it assumes that all observations for a given set of predictors share one underlying rate, equal to both the mean and the variance, which does not hold in the data at hand. In this setting, the Poisson model assumes one rate of interruptions for all MPs with a given combination of values for parliament number, gender, and political party, and that any other variation observed is due solely to randomness. This assumption is not reasonable here because there are sources of variance that cannot be observed which influence the rate at which an MP is interrupted, such as speaking style or personality. For example, an MP who is aggressive or harsh would likely get interrupted more frequently than one who is not aggressive. Since these sources of heterogeneity cannot be observed, the amount of variation present in the data will be higher than what would be expected under the Poisson model, and the assumption of an equal mean and variance will be violated. This situation is referred to as overdispersion.

One way to check for overdispersion is by comparing the residual deviance of a model to its degrees of freedom. If the model and assumed variance structure are a good fit for the data, then these two values should be approximately equal (i.e., ratio of  $\approx 1$ ) (Roback and Legler 2021). To validate our choice to use a Negative Binomial model instead of a Poisson model, we compared the ratio of residual deviance and degrees of freedom in both models. Under the Poisson model, this value is  $\approx 18.7$ , indicating major overdispersion. In contrast, under the Negative Binomial model, this value is  $\approx 1.01$ , which is indicative of a better model fit. Over-dispersion is not an issue in the Negative Binomial case because the variance structure of the model accounts for it by including a dispersion parameter  $\theta$ , which allows the variance to exceed the mean, thereby accounting for unobserved sources of variation. This leads to an improved model fit and more reliable estimates.

In line with Rayment (2024), the model will have fixed effects for parliament number to capture contextual changes between parliaments, as well as an offset for the number of times it was an MP's turn to speak, to account for the fact that an MP who gives more speeches has more opportunities to be interrupted. This model design allows us to predict the number of interruptions that will be directed towards an MP with a certain set of characteristics in a single parliament period.

## Data Wrangling

To prepare the data for our purposes, some reshaping and filtering was necessary. First, the corpus was filtered to only include Chamber proceedings, and proceedings from parliaments 39 to 47. Rows with a missing `speech_no` value were then removed, since this variable is essential for preparing the data for modeling. We identified that the only rows which had a null `speech_no` were stage directions, business starts, and questions in writing. Importantly, there were no interjections associated with rows with a missing speech number, so filtering them out is unlikely to meaningfully affect the analysis. Next, a new variable called `parliament_num` was added to the corpus so that the correct parliament number associated with each sitting day was available, and could be used as a fixed effect in the model. As mentioned, the earliest and latest dates captured in the corpus for each parliament are outlined in Table 10 in the Appendix.

Based on the model design described above, the input data must have one row for every MP per parliament, with their party affiliation, gender, number of interruptions received (outcome), and the number speaking turns (offset). For the offset, we count each row within a given speech separately as a speaking turn. For example, in Table 7, it is Craig Emerson's turn to speak, and during this speech he was interrupted 5 times. After making his first statement, he was interrupted by both Bronwyn Bishop and Government members. Once the Speaker called "Order!" and he continued speaking, he was interrupted by Luke Simpkins. The Speaker spoke up again, and then Craig Emerson spoke for the third time, after which he was interrupted by Opposition members, and finally the Speaker gave the floor to the Manager of Opposition Business to begin a new speech. Although this all happened within a single speech in which Craig Emerson had the floor, it contributes 3 units (i.e., speaking turns) to the offset because there were 3 separate instances in which Craig Emerson had a speaking turn and could be interrupted. This would also contribute 5 units (i.e., interjections) to the outcome count, because Craig Emerson was interrupted 5 times during this speech.

To prepare the model input data, the number of speaking turns was first computed using the logic described above. For each speech in the corpus, the MP whose turn it was to speak was identified as the individual with the smallest order number. Only rows corresponding to that MP were retained for each speech, and the total number of statements per MP, parliament, and party affiliation were then counted. This produced a dataframe with each MP's name, parliament number, party affiliation, and number of speaking turns.

The number of interjections made towards each MP was calculated by first identifying the MP whose turn it was to speak for each speech, as previously described. Then, rows corresponding to statements made by other MPs that were flagged as interjections were retained. The remaining rows were then used to count the total number of interjections received per MP, parliament, and party. This data table was then merged with the table of speaking turns, and any MPs with no recorded interjections in the corpus were assigned a value of zero.

It is possible for an MP to change political parties within a single parliamentary period. In

name	order	speech_no	partyName	body	gender	interject
Emerson, Craig	155	74	Australian Labor Party	I thank my friend the member for Moreton not only...	male	0
Bishop, Bronwyn	156	74	Liberal Party of Australia	Speaker, I rise on a point of order. Under the...	female	1
Government members	157	74	NA	Government members interjecting-	NA	1
The SPEAKER	158	74	NA	Order!	NA	0
Bishop, Bronwyn	159	74	Liberal Party of Australia	when an answer only had to be relevant, that sort...	female	1
The SPEAKER	160	74	NA	The minister has the call and should avoid debate in...	NA	0
Emerson, Craig	161	74	Australian Labor Party	Speaker, I was asked about alternative approaches to the responsible...	male	0
Simpkins, Luke	162	74	Liberal Party of Australia	Just pour another \$100 million in.	male	1
The SPEAKER	163	74	NA	The member for Cowan has been advised every day this...	NA	0
Emerson, Craig	164	74	Australian Labor Party	The dam heights, according to the coalition, should be high....	male	0
Opposition members	165	74	NA	Opposition members interjecting-	NA	1
The SPEAKER	166	74	NA	Order! I am seeking quiet. The Manager of Opposition Business...	NA	0

Table 7: All rows of speech number 74 from 12 February 2014

those cases, there is a separate row in the input data for each party affiliation. For example, Julia Banks quit the Liberal Party of Australia to join the Independent Party on 27 November 2018, during the forty-fifth parliament (Parliament of Australia 2025). As such, the number of speaking turns and interjections received were counted separately for each combination of party and parliament number. Finally, the gender of each MP was added to the input table using the `gender` variable in the corpus. The first 15 rows of the resulting dataset are shown below in Table 8.

## Model Notation

The model is denoted as follows:

$$y_i \sim \text{Negative Binomial}(\mu_i, \theta)$$

$$\log(\mu_i) = \beta_0 + \beta_1 \text{Woman}_i + \sum_{k=1}^8 \beta_k \text{Parliament}_{ki} + \sum_{j=1}^{11} \beta_j \text{Party}_{ji} + \log(S_i)$$

where

- $\mu_i$  is a count of the expected number of interruptions for MP  $i$
- $\theta$  is the dispersion parameter
- $\text{Woman}_i$  is a dummy variable equal to 1 if MP  $i$  is a woman, and 0 otherwise
- $\text{Parliament}_{ki}$  is a dummy variable equal to 1 if MP  $i$  is part of parliament  $k$ , and 0 otherwise. There are 9 unique parliamentary periods in the corpus, and the sum ranges from 1 to 8 because the 9<sup>th</sup> acts as the reference category

name	parliament_num	partyAbbrev	n_statements	n_times_interjected	gender
Abbott, Tony	39	LIB	500	411	male
Abbott, Tony	40	LIB	1258	655	male
Abbott, Tony	41	LIB	918	519	male
Abbott, Tony	42	LIB	354	78	male
Abbott, Tony	43	LIB	963	225	male
Abbott, Tony	44	LIB	2761	1771	male
Abbott, Tony	45	LIB	19	2	male
Adams, Dick	39	ALP	107	20	male
Adams, Dick	40	ALP	69	30	male
Adams, Dick	41	ALP	79	16	male
Adams, Dick	42	ALP	70	11	male
Adams, Dick	43	ALP	103	3	male
Albanese, Anthony	39	ALP	220	63	male
Albanese, Anthony	40	ALP	194	49	male
Albanese, Anthony	41	ALP	451	146	male

Table 8: First 15 rows of the model input dataset

- $\text{Party}_{ji}$  is a categorical variable that reflects the party  $j$  that MP  $i$  is a member of in the specified parliament. There are 12 unique party affiliations in the corpus, and the sum ranges from 1 to 11 because the 12<sup>th</sup> acts as the reference category
- $\log(S_i)$  is the offset term for the number of speaking turns had by MP  $i$

## Analysis and Results

This analysis was performed using R Statistical Software, version 4.3.3 (R Core Team 2024). After preparing the model input data as described, the `glm.nb` function from the `MASS` package was used to fit a Negative Binomial regression model with a log link function, as defined in the previous section (Venables and Ripley 2002). The parliament number, party abbreviation and gender variables were all coded as factors to ensure they were correctly interpreted as categorical variables in the model.

This model output has a total of 21 coefficients: 1 intercept coefficient, 8 parliament number coefficients where the reference category is parliament number 47, 11 party coefficients where the reference category is ALP (Australian Labor Party), and 1 coefficient for the woman variable. Since the outcome of the Negative Binomial model is on the log scale, exponentiating the coefficient values yields rate ratios which are easier to interpret. For categorical variables, rate ratios capture the multiplicative effect of a variable on the expected count of interjections, relative to its reference category. A rate ratio which is greater than 1 implies that the expected count of interjections is higher than the reference category, and a rate ratio less than 1 indicates that the expected count of interjections is lower than the reference category. This effect can also be expressed in terms of percentages. For instance, a rate ratio of 0.75 corresponds

to a 25% lower expected count compared to the reference category, while a rate ratio of 1.30 corresponds to a 30% higher expected count compared to the reference category. The coefficients, exponentiated coefficients (i.e., rate ratios), and p-values are summarized in Table 9. Table 11 in the Appendix provides the full party name associated with each abbreviation.

The `parliament_num` coefficients capture how the expected number of interjections in one parliament compares to that in the 47th parliament (the reference category), holding gender and party constant. Since the rate ratio for the 39th parliament is 1.50, this indicates that MPs in parliament 39 are expected to be interrupted 1.5 times (or 50%) more than MPs in parliament 47. In contrast, this output tells us that an MP in parliament 46 is expected to be interrupted about 32.4% less than an MP in parliament 47 (Rate Ratio = 0.676). Interestingly, the rate ratios for earlier parliaments (i.e., 39 through 44) are all greater than 1, while the rate ratios for later parliaments (i.e., 45 and 46) are less than 1. This suggests temporal changes in the frequency of being interrupted, holding gender and party constant. The p-value column indicates that the coefficients for parliaments 39, 40, 41, 42, and 46 are statistically significant at the level of 0.05.

The estimated rate ratios for `party` range from 0.149 for NATS WA to 1.216 for NAT. The only two parties with rate ratios greater than 1 are NAT and PUP, however, both coefficients are not statistically significant ( $p = 0.605$  and  $p = 0.930$ , respectively). This suggests that, after controlling for gender and parliament, MPs from these parties are not significantly more likely to be interrupted than those from the reference category (ALP). For the other 9 parties, the rate ratios are below 1, indicating a lower expected number of interjections compared to MPs in ALP, holding gender and parliament constant. Among these, the coefficients for CA, IND, NATS WA, and NXT are statistically significant ( $p < 0.05$ ). For example, the estimated rate ratio for IND is 0.638, implying that an MP in the Independent party is expected to experience about 36% fewer interruptions than an MP in the Australian Labor Party, controlling for gender and parliament.

Finally, the `gender` rate ratio indicates that a woman MP is expected to be interrupted about 26.7% less than a man MP holding party and parliament constant. The associated p-value ( $\approx 0$ ) implies that this effect is highly significant.

## Conclusion

## Acknowledgements

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Term	Regression Coefficient	Rate Ratio	P-value
(Intercept)	-1.614	0.199	0.000
parliament_num39	0.403	1.496	0.000
parliament_num40	0.373	1.452	0.000
parliament_num41	0.235	1.265	0.002
parliament_num42	0.184	1.202	0.018
parliament_num43	0.009	1.009	0.908
parliament_num44	0.141	1.151	0.068
parliament_num45	-0.041	0.960	0.593
parliament_num46	-0.392	0.676	0.000
partyCA	-1.000	0.368	0.016
partyCLP	-0.219	0.803	0.516
partyGRN	-0.179	0.836	0.420
partyIND	-0.449	0.638	0.000
partyKAP	-0.116	0.891	0.696
partyLIB	-0.067	0.935	0.090
partyNAT	0.196	1.216	0.605
partyNATS WA	-1.906	0.149	0.044
partyNP	-0.003	0.997	0.959
partyNXT	-1.759	0.172	0.029
partyPUP	0.060	1.062	0.930
genderWoman	-0.311	0.733	0.000

Table 9: Regression Results

## Appendix

Parliament Number	First Sitting Day	Last Sitting Day
39	10 November 1998	27 September 2001
40	12 February 2002	12 August 2004
41	16 November 2004	20 September 2007
42	12 February 2008	24 June 2010
43	28 September 2010	27 June 2013
44	12 November 2013	05 May 2016
45	30 August 2016	04 April 2019
46	02 July 2019	31 March 2022
47	26 July 2022	27 March 2025

Table 10: Earliest and latest sitting days in the corpus for each parliament

Party Abbreviation	Party Name
ALP	Australian Labor Party
CA	Centre Alliance
CLP	Country Liberal Party (Northern Territory)
GRN	Australian Greens
IND	Independent
KAP	Katters Australian Party
LIB	Liberal Party of Australia
NAT	Nationalist Party
NATS WA	National Party of Australia (WA)
NP	The Nationals
NXT	Nick Xenophon Team
PUP	Palmer United Party

Table 11: Abbreviations and full names of Australian political parties

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