All Women Short lists Methodology

TO DO:

1. summary stats on speeches
2. Male MP topic models
3. Re-run, excluding as_speaker==TRUE

Methodology

Previous research on gender differences in political speech patterns has focused on differences between male and female politicians (Yu 2014) or on variations in Hilary Clinton's speech patterns (Jones 2016; Bligh et al. 2010).

To account for the possible effects of age, parliamentary experience and cohort, and in order to compare women selected through all women short lists to women who were not (but who theoretically had the opportunity to contest all-women short lists), our analysis is been restricted only to Labour MPs first elected to the House of Commons in the 1997 General Election, up to but excluding the 2017 General Election. Comparisons between MPs of different parties are also restricted to MPs first elected in the 1997 General Election, and before the 2017 General Election. Speeches made by the Speaker, including Deputy Speakers, were also excluded. Words contained in parentheses were removed, as they are added by Hansard to provide additional information not actually spoken by the MP.[1] Speeches and MP data is from a previously assembled dataset (Odell 2018). Information on candidates selected through all women short lists is from the House of Commons Library (Kelly 2016). Unsuccessful General Election candidates selected through all women short lists who were subsequently elected in a byelection are classified as having been selected on an all women short list.

Word classification used the `Linguistic Inquiry and Word Count 2015` (LIWC) dictionary (Pennebaker et al. 2015) and tokenising tools from the `Quanteda` R package (Benoit 2018). Word counts and words-per-sentence were calculated using `stringi` (Gagolewski 2018), a wrapper to the ICU regex library.

Following Yu (2014) drawing on (Newman et al. 2008) we used the following LIWC categories:

- All Pronouns (pronoun)
- First person singular pronouns (i)
- First person plural pronouns (we)
- Verbs (verb)
- Auxiliary verbs (auxverb)
- Social processes (social)
- Positive emotions (posemo)
- Negative emotions (negemo)
- Tentative words (tentat)
- Articles (article)
- Prepositions (preps)
- Anger words (anger)
- Swear words (swear)
- Cognitive processes (cogproc)
- Words longer than six letters (Sixltr)

We also included mean words-per-sentence (WPS), total speach word count (WC) and Flesch–Kincaid grade level (FK) (Kincaid et al. 1975), calculated using `Quanteda` (Benoit 2018) and `stringi` (Gagolewski 2018).

[1] e.g. a reference to "the member for Bethnal Green and Bow" in keeping with Parliamentary convention of identifying MPs by their seat rather than their name would be followed by "(Rushnara Ali)".

Table 1: Labour MPs and Intakes

General Election	Total MPs	Labour MPs	Female Labour MPs	Percentage Women MPs	Newly Elected MPs	In
1997	659	418	101	24%	177	
2001	659	412	95	23%	38	
2005	646	355	98	28%	40	
2010	650	258	81	31%	64	
2015	650	232	99	43%	49	

Table 2: Number of Speeches and Words in Dataset

Gender	Speeches	Words
All	656412	111180398
Female	148702	26231034
Male	507710	84949364
Conservatives		
All	285291	44800169
Female	48768	7363031
Male	236523	37437138
Labour		
All	261942	46494850
Female	84569	15897929
Non-All Women Shortlists	28695	5422776
All Women Shortlists	55874	10475153
Male	177373	30596921
Liberal Democrat		
All	72716	13485902
Female	7552	1503459
Male	65164	11982443
Other		
All	36463	6399477
Female	7813	1466615
Male	28650	4932862

Descriptive Statistics

```
##
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':
##
##     filter, lag

## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

Data in this table is from House of Commons library reports (Kelly 2016; Audickas, Hawkins, and Cracknell 2017). All women short lists were not used by Labour during the 2001 General Election.

Table 3: Effect Sizes for Male and Female Labour MPs

	Women		Men		Effect Size	
	Mean	SD	Mean	SD	Cohen's D	Magnitude
All Pronouns	10.07	4.60	10.15	4.99	0.02	negligible
First person singular pronouns	1.89	2.42	2.03	2.55	0.06	negligible
First person plural pronouns	0.97	1.42	0.99	1.51	0.01	negligible
Verbs	12.81	4.99	12.67	5.35	-0.03	negligible
Auxiliary verbs	7.90	3.45	7.93	3.69	0.01	negligible
Social processes	8.46	4.82	8.17	5.11	-0.06	negligible
Positive emotions	2.73	2.48	2.57	2.54	-0.06	negligible
Negative emotions	1.16	1.68	1.08	1.77	-0.05	negligible
Tentative words	1.48	1.74	1.57	1.90	0.05	negligible
More than six letters	19.82	6.96	19.08	7.33	-0.11	negligible
Articles	7.64	3.30	7.96	3.55	0.10	negligible
Prepositions	12.57	4.41	12.14	4.74	-0.10	negligible
Anger words	0.24	0.82	0.24	0.79	0.01	negligible
Swear words	0.00	0.06	0.00	0.09	0.01	negligible
Cognitive processes	8.68	4.82	8.82	5.14	0.03	negligible
Words per Sentence	43.23	19.41	40.79	19.74	-0.12	negligible
Total Word Count	402.34	689.78	369.53	645.77	-0.05	negligible
Flesh-Kincaid Grade Level	10.64	7.58	9.63	7.75	-0.13	negligible

Women vs Men

There are no categories where gender differences meet the effect size threshold of |0.2| suggested by Cohen (1988, 25–26) to indicate a small effect. 4 categories – words with more than six letters, prepositions, words-per-sentence and Flesh-Kincaid grade level – exceeded the |0.1| threshold suggested by Newman et al (2008).

Short lists vs Non-Short lists

The following plots show changes in the occurences of selected LIWC terms, words-per-sentence, total word count and Flesch–Kincaid grade level, over the course of an MP's career. There do not appear to be any notable changes in speaking style over the course of female Labour MPs' careers.

There are no categories among female Labour MPs by selection process meeting the |0.2| threshold. Only one category – first person plural pronouns, d=0.19 – exceeded |0.1|.

Conservatives vs Labour

There are no categories with effect sizes exceeding |0.2| between Labour and Conservative MPs, like inter-Labour differences.

All MPs Gender Differences

POS Analysis

Part-of-speech (POS) tagging was done using `spaCy` (Honnibal and Montani 2017) and the `spacyr` package (Benoit and Matsuo 2018).

Table 4: Effect Sizes for Female Labour MPs by selection process

	All Women Short lists		Open Shorlists		Effect Size	
	Mean	SD	Mean	SD	Cohen's D	Magnitude
All Pronouns	10.01	4.66	10.18	4.47	-0.04	negligible
First person singular pronouns	1.86	2.41	1.95	2.42	-0.04	negligible
First person plural pronouns	0.88	1.36	1.15	1.51	-0.19	negligible
Verbs	12.87	5.09	12.68	4.79	0.04	negligible
Auxiliary verbs	7.93	3.48	7.85	3.38	0.02	negligible
Social processes	8.46	4.93	8.44	4.58	0.00	negligible
Positive emotions	2.69	2.52	2.81	2.42	-0.05	negligible
Negative emotions	1.17	1.69	1.13	1.67	0.02	negligible
Tentative words	1.48	1.75	1.49	1.73	0.00	negligible
More than six letters	19.72	7.06	20.03	6.75	-0.05	negligible
Articles	7.69	3.38	7.55	3.14	0.04	negligible
Prepositions	12.55	4.54	12.63	4.15	-0.02	negligible
Anger words	0.23	0.78	0.24	0.90	-0.01	negligible
Swear words	0.00	0.06	0.00	0.05	0.01	negligible
Cognitive processes	8.59	4.89	8.85	4.67	-0.06	negligible
Words per Sentence	43.61	20.18	42.48	17.79	0.06	negligible
Total Word Count	401.30	702.85	404.36	663.60	0.00	negligible
Flesh-Kincaid Grade Level	10.80	7.88	10.33	6.96	0.07	negligible

Table 5: Effect Sizes for All Labour and Conservative MPs

	Labour		Conservatives		Effect Size	
	Mean	SD	Mean	SD	Cohen's D	Magnitude
All Pronouns	10.12	4.87	10.60	4.84	0.10	negligible
First person singular pronouns	1.98	2.51	2.14	2.56	0.06	negligible
First person plural pronouns	0.98	1.48	1.22	1.70	0.15	negligible
Verbs	12.71	5.24	12.91	5.14	0.04	negligible
Auxiliary verbs	7.92	3.61	8.15	3.58	0.06	negligible
Social processes	8.26	5.02	8.11	4.80	-0.03	negligible
Positive emotions	2.62	2.52	2.85	2.66	0.09	negligible
Negative emotions	1.10	1.75	1.05	1.78	-0.03	negligible
Tentative words	1.54	1.85	1.57	1.88	0.01	negligible
More than six letters	19.32	7.22	19.23	7.04	-0.01	negligible
Articles	7.86	3.48	7.81	3.45	-0.01	negligible
Prepositions	12.28	4.64	12.36	4.49	0.02	negligible
Anger words	0.24	0.80	0.24	0.82	0.00	negligible
Swear words	0.00	0.08	0.00	0.10	0.00	negligible
Cognitive processes	8.77	5.04	8.84	5.06	0.01	negligible
Words per Sentence	41.58	19.67	42.45	19.89	0.04	negligible
Total Word Count	380.12	660.47	335.91	592.76	-0.07	negligible
Flesh-Kincaid Grade Level	9.96	7.71	10.28	7.81	0.04	negligible

Table 6: Effect Sizes for Male and Female MPs, All Parties

	Women		Men		Effect Size	
	Mean	SD	Mean	SD	Cohen's D	Magnitude
All Pronouns	10.31	4.65	10.26	4.90	-0.01	negligible
First person singular pronouns	1.99	2.45	2.00	2.52	0.00	negligible
First person plural pronouns	1.11	1.57	1.08	1.59	-0.02	negligible
Verbs	12.88	4.97	12.80	5.26	-0.02	negligible
Auxiliary verbs	8.00	3.45	8.08	3.64	0.02	negligible
Social processes	8.45	4.77	8.00	4.93	-0.09	negligible
Positive emotions	2.84	2.53	2.69	2.58	-0.06	negligible
Negative emotions	1.10	1.65	1.08	1.78	-0.01	negligible
Tentative words	1.47	1.73	1.61	1.91	0.08	negligible
More than six letters	19.73	6.94	19.25	7.18	-0.07	negligible
Articles	7.62	3.31	8.00	3.51	0.11	negligible
Prepositions	12.58	4.36	12.22	4.62	-0.08	negligible
Anger words	0.23	0.78	0.25	0.82	0.02	negligible
Swear words	0.00	0.05	0.00	0.10	0.01	negligible
Cognitive processes	8.67	4.79	8.93	5.12	0.05	negligible
Words per Sentence	43.25	19.45	42.06	20.12	-0.06	negligible
Total Word Count	377.31	648.92	358.13	623.49	-0.03	negligible
Flesh-Kincaid Grade Level	10.63	7.61	10.16	7.89	-0.06	negligible

Table 7: Part-of-Speech Effect Sizes for Male and Female Labour MPs

	Women		Men		Effect Size	
Word Type	Mean	SD	Mean	SD	Cohen's D	Magnitude
All Nouns	22.23	9.59	21.72	10.95	-0.04	negligible
Plural Nouns	5.89	3.72	5.07	3.80	-0.16	negligible
Singular Nouns	15.64	9.83	16.04	11.19	0.03	negligible
Adjectives	9.58	4.77	9.29	5.29	-0.02	negligible
Adverbs	4.91	4.26	5.07	4.91	0.03	negligible
Verbs	20.95	9.52	20.80	10.27	-0.02	negligible

Table 8: Part-of-Speech Effect Sizes for Male and Female Labour MPs

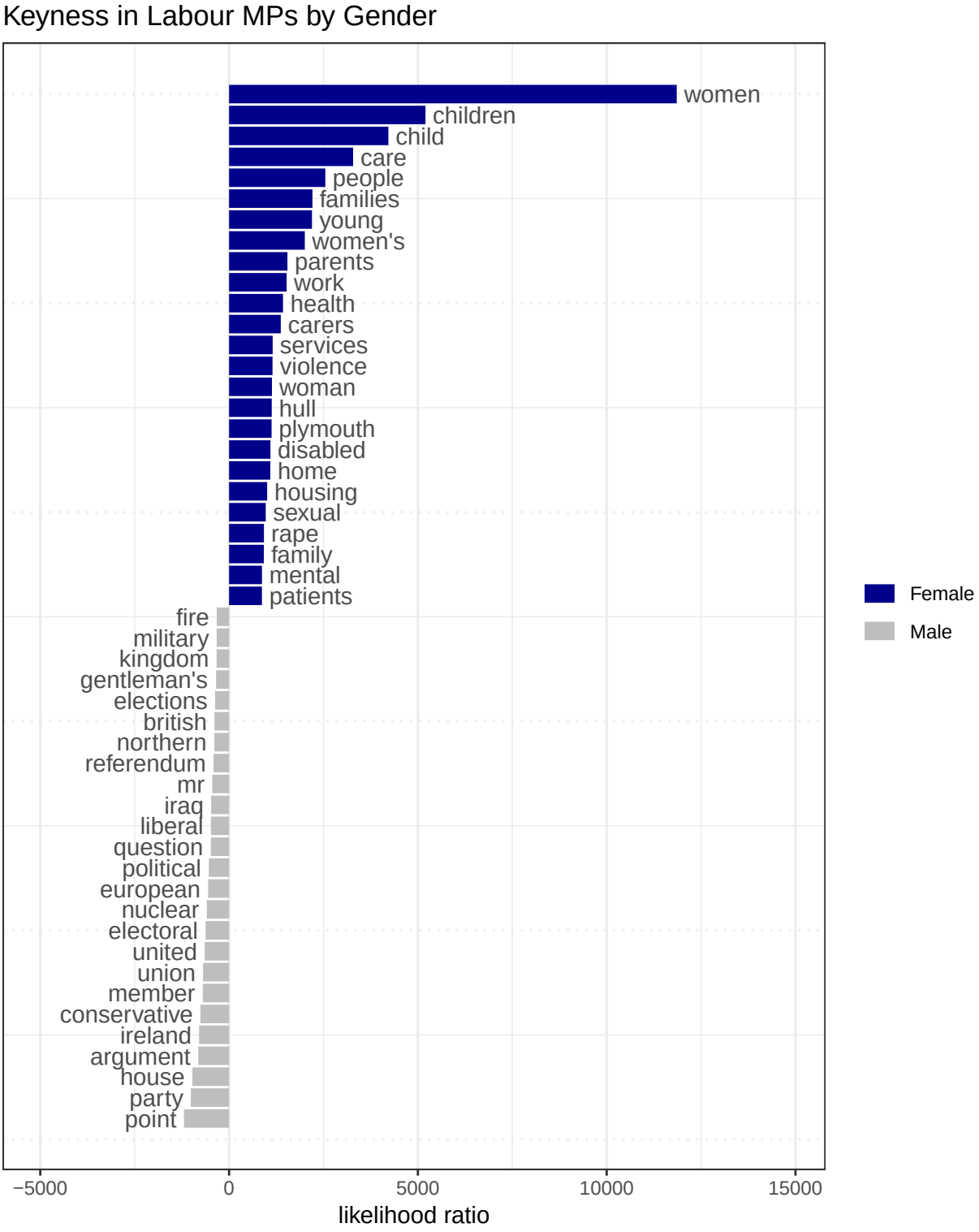
	All Women Short lists		Open Shorlists		Effect Size	
Word Type	Mean	SD	Mean	SD	Cohen's D	Magnitude
All Nouns	22.22	8.76	22.24	9.98	-0.04	negligible
Plural Nouns	6.06	3.60	5.80	3.77	-0.16	negligible
Singular Nouns	15.54	8.96	15.70	10.25	0.03	negligible
Adjectives	9.83	4.59	9.45	4.86	-0.02	negligible
Adverbs	4.95	3.77	4.89	4.48	0.03	negligible
Verbs	20.89	9.03	20.98	9.76	-0.02	negligible

Tokenising / Keyness

The most commonly used words by both men and women would be protocol boilerplate expressions, so we calculate the keyness of words to identify gender differences in the choices of topics raised by men and women, and by short-list and non-short list women.

Men vs Women

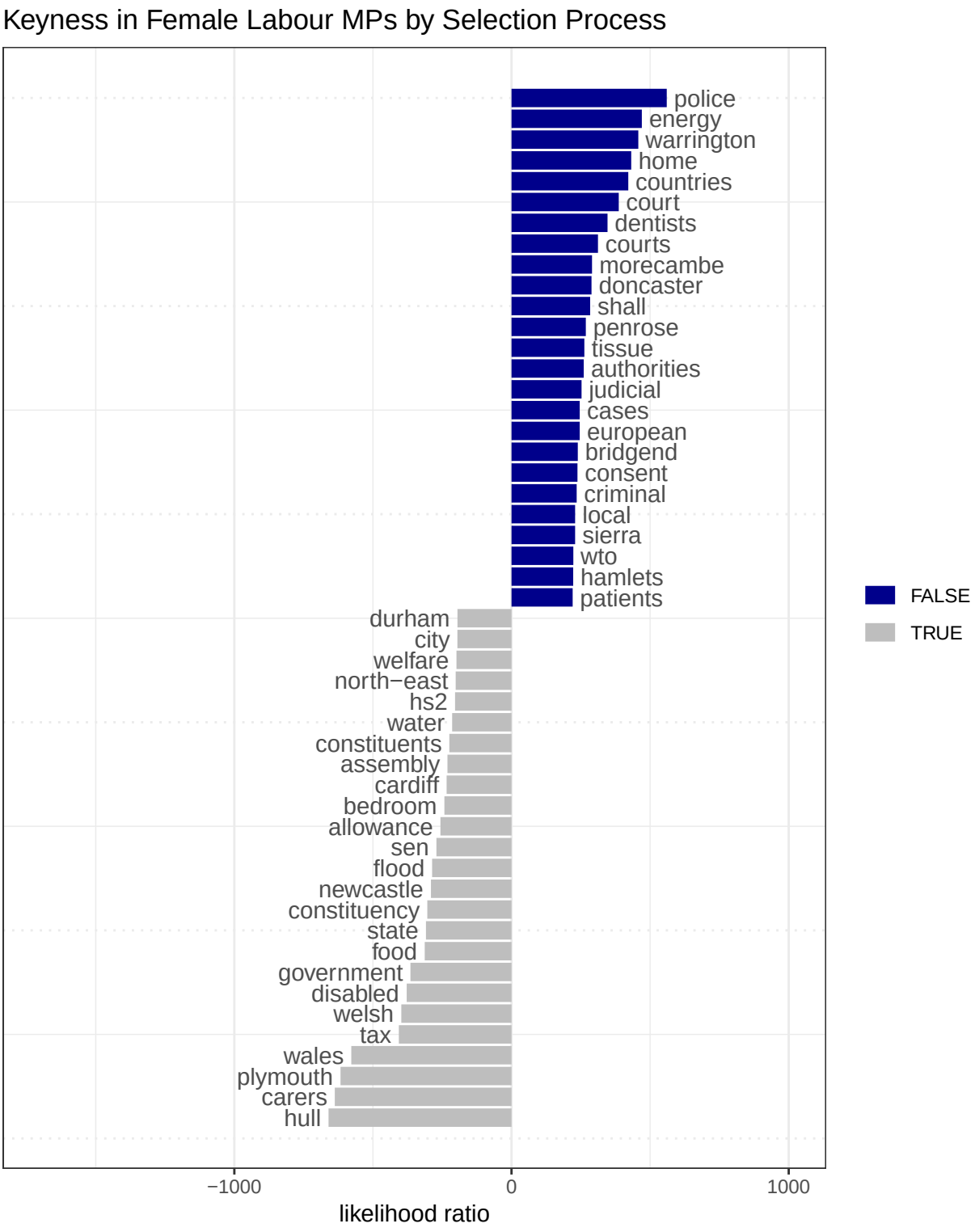
```
## Package version: 1.3.4

## Parallel computing: 2 of 4 threads used.

## See https://quanteda.io for tutorials and examples.

##
## Attaching package: 'quanteda'

## The following object is masked from 'package:utils':
##
##     View
```



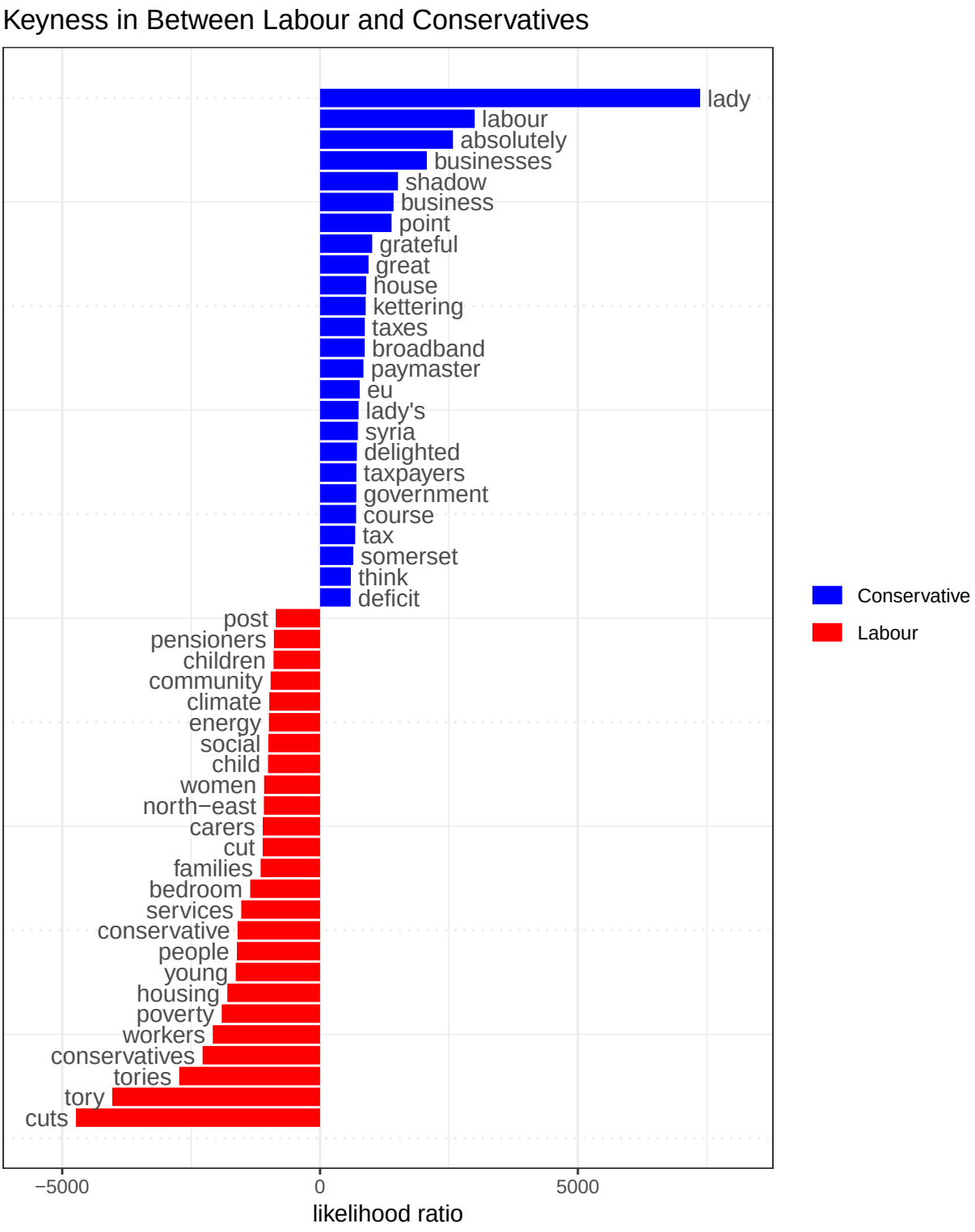
Keyness – a linguistic measure of the frequency of different words in two groups of texts – reveals clear gender differences in the most disproportionately common words used by female and male Labour MPs. Unsurprisingly, despite male MPs saying almost twice as many words (30601887 vs 15898845) as their female colleagues, female Labour MPs were more than two-and-a-half (2.61) times as likely to say "women". They were also much more likely to refer to "women's" and "woman". Female Labour MPs also appear much more likely to discuss "children", "people", "care", "families", "home", "parents", "work" and social policy

areas such as “services”, “disabled [people]” and “housing” than their male colleagues. Male MPs were more likely to refer to military topics (“Iraq”, “nuclear”), and to parliamentary process and protocol – “question”, “political”, “conservative”, “electoral”, “house”, “party”, “argument” “liberal” and “point” are far more common in speeches by male Labour MPs than by female ones. This could suggest that male MPs are more comfortable using the traditional language of House of Commons debate.

Short lists vs Non-Short lists



Labour vs Conservative



Keyness differences by selection process are not as obviously stereotypical. Nonetheless, the most common words amongst AWS MPs included "carers", "disabled", "bedroom" and "sen"[2]. Also of note is AWS MPs

[2]Special Educational Needs

making more references to their "constituency" and its "constituents", [drawing on representation of]

Topic Models

Short lists vs Non-Short lists

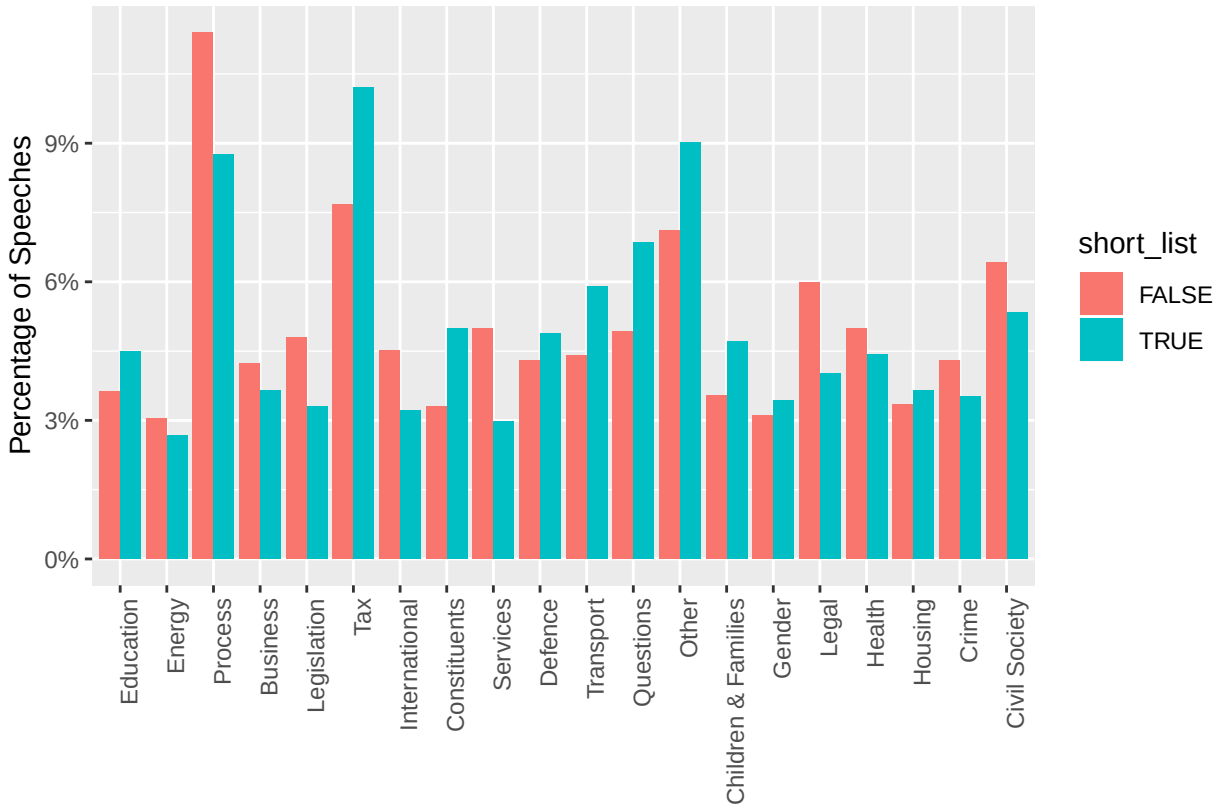


Table 9: Topic Model Terms (continued below)

Education	Energy	Process	Business	Legislation
education	energy	issues	business	amendment
schools	change	committee	companies	clause
young	fuel	hope	businesses	act
school	climate	process	company	amendments
children	water	system	financial	legislation
skills	bills	might	small	provisions
training	green	matter	scheme	regulations
teachers	prices	scotland	sector	1
students	companies	proposals	industry	information
parents	industry	concerns	post	section
learning	power	consider	market	provision
university	gas	different	office	lords
funding	market	raised	pay	2
pupils	price	clear	private	order
educational	environmental	scottish	bank	powers
needs	carbon	decisions	insurance	authorities
constituency	environment	case	money	power
special	waste	believe	credit	guidance

Education	Energy	Process	Business	Legislation
college	emissions	understand	competition	duty
good	oil	possible	debt	committee

Table 10: Table continues below

Tax	International	Constituents	Services	Defence
tax	uk	constituents	services	world
million	european	constituency	service	defence
budget	countries	wales	staff	international
cuts	eu	day	system	forces
pay	union	two	funding	british
chancellor	united	told	provide	security
cut	trade	months	national	war
pension	world	like	money	speech
billion	food	mr	resources	armed
jobs	europe	family	authority	foreign
income	british	week	needs	today
increase	international	weeks	plans	northern
government's	states	constituent	authorities	community
economy	research	ago	quality	conflict
rate	kingdom	families	review	part
impact	industry	thank	extra	ireland
money	development	received	deliver	un
benefit	economic	welsh	plan	peace
spending	britain	three	standards	east
cost	farmers	came	better	military

Table 11: Table continues below

Transport	Questions	Other	Children & Families
transport	report	going	children
regional	committee	back	child
jobs	statement	go	care
city	review	see	families
investment	question	things	parents
constituency	department	good	disabled
london	speaker	like	social
areas	questions	even	carers
rail	ministers	conservative	family
north	mr	come	young
area	published	let	benefit
bus	thank	something	working
west	response	opposition	help
economic	today	really	poverty
development	office	saying	employment
rural	deputy	might	vulnerable
east	order	party	children's
economy	answer	done	disability
north-east	leader	money	benefits

Transport	Questions	Other	Children & Families
infrastructure	government's	today	life

Table 12: Table continues below

Gender	Legal	Health	Housing	Crime
women	home	health	housing	police
men	cases	nhs	council	crime
vote	court	care	homes	officers
labour	justice	hospital	authorities	behaviour
rights	law	patients	london	young
parliament	legal	mental	councils	prison
equality	case	treatment	planning	policing
party	victims	services	social	safety
women's	criminal	cancer	communities	home
pay	courts	medical	areas	use
election	evidence	trust	private	community
age	violence	hospitals	authority	antisocial
liberal	domestic	patient	home	problem
political	abuse	primary	affordable	alcohol
commission	rights	doctors	land	serious
discrimination	immigration	community	area	drugs
equal	system	social	building	drug
woman	human	trusts	accommodation	tackle
society	protection	nurses	property	powers
elections	security	clinical	rent	communities

Civil Society
programme
community
organisations
help
working
taking
good
lady
steps
voluntary
sure
department
sector
welcome
communities
thank
information
groups
aware
progress

Table 14: Topic Model Distribution

Topic	Not Short List Total	Short List Total	Not Short List Percentage	Short List Percentage	Rela
Education	1007	2407	3.62	4.50	
Energy	846	1425	3.04	2.66	
Process	3171	4686	11.40	8.76	
Business	1179	1950	4.24	3.65	
Legislation	1334	1763	4.80	3.30	
Tax	2137	5455	7.68	10.20	
International	1256	1723	4.52	3.22	
Constituents	920	2667	3.31	4.99	
Services	1387	1590	4.99	2.97	
Defence	1192	2612	4.29	4.88	
Transport	1227	3150	4.41	5.89	
Questions	1368	3670	4.92	6.86	
Other	1975	4824	7.10	9.02	
Children & Families	985	2523	3.54	4.72	
Gender	865	1839	3.11	3.44	
Legal	1667	2146	5.99	4.01	
Health	1386	2372	4.98	4.44	
Housing	931	1947	3.35	3.64	
Crime	1192	1881	4.29	3.52	
Civil Society	1783	2853	6.41	5.33	

We assigned topic models using unsupervised Latent Dirichlet Allocation (Blei, Ng, and Jordan 2003), implemented in the `topicmodels` R package (Grün and Hornik 2011). See [TABLE NUMBER?] for the ten most common words in each topic model. Topic models were trained on all speeches by female Labour MPs.

Machine learning

We trained a Naive Bayes classifier with document-frequency priors and a multinomial distribution to predict the gender of speakers when given speeches by all Labour MPs in our dataset, and the selection process when only given female Labour MPs. The accuracy of both models were roughly equivalent, 70.83% accuracy when predicting gender and 70.31% when predicting short lists. By contrast, the classifier could distinguish between Labour and Conservative speeches with 74.06% accuracy.

Discussion

There do not appear to be substantial or meaningful differences in the speaking styles or topic choices of female Labour MPs selected through all women short lists when compared to their female colleagues selected through open short lists. The few small differences between male and female Labour MPs were not replicated when comparing female Labour MPs by how they were selected.

There is more gender distinction in selected terms and topics.

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