

Supplementary Material for

Science on the political stage: analysing representations of science in Austrian parliamentary debates

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Appendix A

A.1 Supplementary Information on Raw Data

Table 1: Number of Speeches in the Nationalrat

Year	ÖVP	SPÖ	FPÖ	Grüne	NEOS	Total
1996	946	1,148	1,034	487	0	3,615
1997	1,185	1,242	1,083	561	0	4,071
1998	962	1,100	1,044	547	0	3,653
1999	776	844	774	423	0	2,817
2000	1,237	1,480	1,337	949	0	5,003
2001	1,006	1,082	1,100	660	0	3,848
2002	820	827	946	516	0	3,109
2003	1,124	1,079	685	679	0	3,567
2004	1,478	1,299	788	708	0	4,273
2005	1,396	1,235	580	659	0	3,870
2006	990	842	266	508	0	2,606
2007	1,040	1,122	531	522	0	3,215
2008	1,140	843	515	476	0	2,974
2009	1,281	1,394	804	728	0	4,207
2010	1,043	1,106	651	560	0	3,360
2011	1,065	1,099	654	556	0	3,374
2012	1,105	1,088	588	528	0	3,309
2013	929	1,055	497	486	32	2,999
2014	927	1,122	658	529	371	3,607
2015	1,015	1,078	702	539	393	3,727
2016	876	985	650	488	364	3,363
2017	666	732	501	346	277	2,522
2018	1,056	945	920	0	429	3,350
2019	732	665	593	54	306	2,350
2020	1,264	947	730	737	517	4,195
2021	1,456	1,028	763	721	542	4,510
2022	657	538	393	455	279	2,322
Total	28,172	27,925	19,787	14,422	3,510	93,816

Note. Data end on 2022-09-30; a further 10,272 speeches were held by independent MPs, smaller parties no longer represented in parliament, and guest speakers.

Appendix B

B.1 Search Strings

All search strings for the science-related subcorpus:

wissenschaft, forschu*, universi*, expert*, studie, empirisch, daten, experiment*, method*, analyse*, theorie*, hypothese*, dissertation*, publikation*, zitation*, forschungsinstitut*, labor*, forschungs*projekt*, grant*, professor*, dozent*, doktorand*, postdoktorand*, habilitation*, lehrstuhl*, ERC*, max-planck*, fraunhofer*, ihs, wifo*

B.2 Robustness of Dictionary Recall

To assess whether the dictionary pre-filter’s false negatives were systematically related to party affiliation, we examined the false negatives identified in the LLM-coded validation subsample ($n = 2,000$). Of the 435 true positive cases in this subsample, 58 were missed by the dictionary. We compared the party distribution of these missed cases to the party distribution of all true positive cases using a chi-square test. The test showed no significant association between party and whether a case was missed ($\chi^2 p = 0.793$), and the share of misses per party closely followed each party’s share of all positive cases. This indicates that the dictionary’s recall does not vary systematically by party, supporting the validity of the between-party comparisons central to RQ1 and RQ2.

B.3 Deduplication

The dictionary selection approach generated duplicates when multiple keywords appeared next to each other, creating overlapping sequences. To prevent these duplicates from skewing our results, we implemented a strategy to exclude them. We calculated the Levenshtein distance between sequences, comparing each sequence to the subsequent five sequences. Duplicates were defined as sequences with a Levenshtein distance of less than 600 and where the ratio of the Levenshtein distance to the sequence’s character count was above 4. This ensured that sequences with substantial overlaps, resulting in lower Levenshtein values, were excluded. Additionally, sequences with more than 25% overlap (Levenshtein ratio > 4) were also removed. This method proved most effective during pre-tests.

B.4 Prompts

The following prompt was used to code the sequences using OpenAI’s GPT-4o model:

```
Assign a numeric code to indicate if the text points to one of the following
concepts: 1 Scientific output (like studies or research reports), 2 Scientific
institutions (like universities or research institutions), 3 Scientific actors
(like scientists or experts), 4 Scientific evidence (like empirical data or
scientific methods), 0 No mention of science, 99 Unsure. Respond with only the
assigned code. If multiple concepts are present, separate the codes with ','
Here is the text:
```

B.5 Excluding Infrequent Terms

In pre-testing, infrequent words dominated the results without representing substantive discussion points, as their rarity meant they typically reflected single, narrowly scoped debates. We therefore excluded all words appearing fewer than 30 times across the full corpus. To identify a suitable threshold, we compared cut-offs of a minimal frequency of 10, 20, 30, and 50. Lower thresholds retained terms tied to isolated policy discussions, such as the names of specific laws, while the highest threshold removed substantively meaningful terms, such as “evidence-based”, “foreigner(s)”, or “leftist(s)”. A threshold of 30 offered the best balance and was adopted for the final analysis.

Appendix C

C.1 Descriptive Results

Table 2: Number of Sequences With Mention of Scientific Evidence

Year	ÖVP	SPÖ	FPÖ	Grüne	NEOS	Total
1996	119	177	176	115	0	587
1997	145	237	106	96	0	584
1998	131	176	90	65	0	462
1999	158	186	109	83	0	536
2000	154	153	152	151	0	610
2001	140	124	91	112	0	467
2002	96	78	94	68	0	336
2003	161	88	102	137	0	488
2004	179	104	93	112	0	488
2005	194	114	78	114	0	500
2006	121	88	17	85	0	311
2007	108	111	66	104	0	389
2008	97	66	56	76	0	295
2009	132	119	53	110	0	414
2010	113	90	34	99	0	336
2011	154	126	47	109	0	436
2012	121	97	45	73	0	336
2013	77	59	36	60	9	241
2014	94	111	60	83	54	402
2015	133	113	56	75	60	437
2016	112	95	65	79	39	390
2017	78	94	43	56	24	295
2018	106	115	88	0	84	393
2019	77	85	55	11	46	274
2020	158	92	70	142	89	551
2021	183	80	120	123	78	584
2022	98	42	58	72	27	297
Total	3,439	3,020	2,060	2,410	510	11,439

Note. Number of sequences referencing scientific evidence per party and year.

Table 3: Ratio of Different Representations of Science for Parties

	ÖVP	SPÖ	FPÖ	Grüne	NEOS	Total
Science	0.194	0.184	0.175	0.214	0.225	0.189
Scientific actor	0.169	0.158	0.151	0.185	0.189	0.163
Scientific evidence	0.101	0.090	0.081	0.115	0.113	0.095

Note. Ratios indicate the proportion of speeches per party that contain at least one reference to the respective category.

C.2 Chi-Square and Pairwise Tests

Table 4: Chi-Square Tests of Independence: Party and Science References

Variable	χ^2	df	p	Cramér's V
Science	118.81	4	< .001	0.036
Actor	99.26	4	< .001	0.033
Evidence	141.91	4	< .001	0.039

Note. All tests are two-tailed. (N = 93,816)

Table 5: Pairwise z-Tests of Science Reference Proportions per Party

Pair	Science			Actor			Evidence		
	p_{Bonf}	p_{Holm}	h	p_{Bonf}	p_{Holm}	h	p_{Bonf}	p_{Holm}	h
ÖVP vs SPÖ	.026	.008	0.025	.003	.001	0.031	< .001	< .001	0.039
ÖVP vs FPÖ	< .001	< .001	0.048	< .001	< .001	0.049	< .001	< .001	0.070
ÖVP vs Grüne	< .001	< .001	-0.050	< .001	< .001	-0.042	< .001	< .001	-0.044
ÖVP vs NEOS	< .001	< .001	-0.077	.027	.008	-0.053	.318	.064	-0.038
SPÖ vs FPÖ	.147	.029	0.023	.535	.107	0.018	.008	.002	0.031
SPÖ vs Grüne	< .001	< .001	-0.076	< .001	< .001	-0.073	< .001	< .001	-0.082
SPÖ vs NEOS	< .001	< .001	-0.102	< .001	< .001	-0.083	< .001	< .001	-0.077
FPÖ vs Grüne	< .001	< .001	-0.099	< .001	< .001	-0.091	< .001	< .001	-0.114
FPÖ vs NEOS	< .001	< .001	-0.125	< .001	< .001	-0.101	< .001	< .001	-0.108
Grüne vs NEOS	1.000	.160	-0.026	1.000	.581	-0.010	1.000	.755	0.006

Note. p_{Bonf} = Bonferroni-corrected p -value; p_{Holm} = Holm-corrected p -value. h = Cohen's h (signed; positive values indicate the first-named party has a higher proportion). All tests are two-tailed.

C.3 Log-Odds Results

Table 6: Typical Words per Party

Party	Word (original)	Translation	Log-odds ratio	Count
ÖVP	studienbeiträge	tuition	2.68	46
	holz	wood	1.95	33
	anbelangt	concerns	1.91	79
	programmen	programs	1.80	33
	karlheinz	karlheinz (name)	1.74	35
	tschechischen	czech	1.62	48
	akademien	academies	1.57	34
	dankeschön	thanks	1.53	30
	europäisches	european	1.53	30
SPÖ	künstlerinnen	artists (f)	1.79	35
	pädagoginnen	educators (f)	1.71	48
	technologiepolitik	technology-policy	1.71	69
	akh	general hospital	1.37	53
	pädagogen	educators (m)	1.31	44

Table 6 (continued)

Party	Word (original)	Translation	Log-odds ratio	Count
FPÖ	arbeitnehmerinnen	employees (f)	1.28	78
	amon	amon (name)	1.27	43
	gastronomie	gastronomy	1.24	49
	geschätzter	valued	1.23	42
	freiheitliche	libertarians	3.30	92
	ausländer	foreigner(s)	2.30	32
	freiheitlichen	libertarian	1.96	214
	linken	lefts / leftists	1.77	34
	aufsichtsrat	supervisory board	1.72	33
	schuldig	guilty	1.61	33
	kindergeld	child benefit	1.60	35
	zuwanderung	immigration	1.58	45
Grüne	expertenhearing	expert hearing	1.54	40
	ökologisch	ecological	1.99	52
	freunde	friends	1.96	34
	stummvoll	stummvoll (name)	1.94	42
	kostenwahrheit	true-cost pricing	1.87	32
	behinderungen	disabilities	1.86	56
	kürzen	cut	1.54	35
	kriegen	get	1.51	30
	facto	(de) facto	1.51	69
	forschungsstrategie	research strategy	1.49	62
NEOS	neos	neos	3.33	139
	evidenz	evidence	2.71	72
	buch	book	2.53	54
	nachher	afterwards	2.52	33
	passivrauchen	passive smoking	2.40	30
	zentralmatura	centralmatura	2.21	31
	evidenzbasierte	evidence-based	2.16	39
	bräuchten	would need	2.13	33
	langer	langer (name)	2.11	37

Note. Typical words per party in speeches containing references to scientific evidence (1996–2022). For each party, the words with the highest log-odds ratios relative to all other parties are listed. Higher values indicate stronger association with the focal party. (f) and (m) denote grammatically female and male forms. All terms are lowercased after preprocessing, therefore also nouns are lowercased in this table. Counts represent total occurrences of the term across the full corpus.

Table 7: Atypical Words per Party

Party	Word (original)	Translation	Log-odds ratio	Count
ÖVP	kassen	(ambiguous)	-2.61	31
	freiheitliche	libertarians	-2.04	92
	khol	khol (name)	-2.01	35
	kostenwahrheit	true-cost pricing	-1.92	32
	amon	amon (name)	-1.79	43
	steuerlichen	fiscal	-1.79	43
	behinderungen	disabilities	-1.76	56
	wissenschaftlerinnen	scientists (f)	-1.66	64
	freiheitlichen	libertarian	-1.56	214
SPÖ	studienbeiträge	tuition	-2.82	46

Table 7 (continued)

Party	Word (original)	Translation	Log-odds ratio	Count
	steuerliche	fiscal	-2.06	44
	cap	cap (name)	-1.91	38
	geimpft	vaccinated	-1.84	54
	belakowitsch	belakowitsch (name)	-1.82	107
	euratom	euratom	-1.79	51
	leiter	ladder / leader	-1.77	33
	minus	minus	-1.75	66
	ausrichtung	orientation	-1.74	32
	infektionen	infections	-1.74	32
FPÖ	forscherinnen	researchers (f)	-3.22	114
	wissenschaftlerinnen	scientists (f)	-2.65	64
	lehrerinnen	teachers (f)	-2.55	117
	pädagoginnen	educators (f)	-2.36	48
	klimaschutz	climate protection	-2.35	145
	unteren	lower (ones)	-2.34	47
	paket	package	-2.32	46
	energiefonds	energy fund	-2.28	44
	temelin	temelin	-2.25	43
	umweltpolitik	environmental policy	-2.25	43
Grüne	eudurchschnitt	eu average	-2.65	54
	mittelschule	middle school	-2.25	36
	akademien	academies	-2.19	34
	betrug	fraud	-2.16	33
	holz	wood	-2.16	33
	benötigt	required	-2.10	31
	dankeschön	thanks	-2.07	30
	rasche	rapid	-2.07	30
	geschätzte	valued	-2.06	248
NEOS	schilling	schilling	-3.39	609
	verehrten	revered	-2.53	258
	letztlich	ultimately	-2.34	212
	damen	ladies	-2.31	2701
	herren	gentlemen	-2.19	2758
	förderung	support	-2.03	313
	heuer	this year	-2.01	153
	studenten	students (m)	-2.01	153
	seitens	on behalf	-2.00	151

Note. Atypical words per party in speeches containing references to scientific evidence (1996–2022). For each party, the words with the lowest log-odds ratios relative to all other parties are listed. More negative values indicate stronger underuse by the focal party. (f) and (m) denote grammatically female and male forms. Counts represent total occurrences of the term across the full corpus.

Appendix D

D.1 Original Full Text of Cited Speeches

Tuition Fee (Example 1)

Original German: Es gibt in diesem Zusammenhang eine sehr aktuelle Studie des Stifterverbandes für die Deutsche Wissenschaft, wo deutsche Bundesländer verglichen wurden, die teilweise **Studienbeiträge** einheben, teilweise nicht. Und hier zeigt sich ganz deutlich, dass die

Frage, ob **Studienbeiträge** eingehoben werden oder nicht, nichts an der sozialen Durchlässigkeit verändert. Es gibt auch in Ländern, wo **Studienbeiträge** eingehoben werden, keine schlechtere soziale Durchmischung (ÖVP, 129016, 2010-11-18).

Own Translation: In this context, there is a very recent study by the Stifterverband für die Deutsche Wissenschaft, which compared German federal states that charge **tuition fees** with those that do not. This study clearly shows that the question of whether or not **tuition fees** are charged has no bearing on social mobility. Even in states where tuition fees are charged, the social mix is no worse (ÖVP, 129016, 2010-11-18).

Tuition Fee (Example 2)

Original German: **Studienbeiträge** sind auch sozial gerecht, weil, wie schon erwähnt, viele andere Ausbildungsgänge – zum Beispiel Meisterprüfung – oft sehr teuer sind und nicht einzusehen ist, warum die einen kostenlos studieren und die anderen mit sehr hohen Summen ihre Ausbildung finanzieren. Sie sind auch sozial gerecht, weil erwiesen ist, dass **Studienbeiträge** in maßvoller Höhe nicht Studierende vom Studium abhalten. Die neueste Studie ist eine aus dem Jahr 2011, in Berlin gemacht mit 40 000 Fällen, die genau das nachweist (ÖVP, 148702, 2012-12-06).

Own Translation: **Tuition fees** are also socially equitable because, as already mentioned, many other training courses – such as master craftsman examinations – are often very expensive, and it is unreasonable for some to study for free while others have to finance their education with very high sums of money. They are also socially equitable because it has been proven that moderate **tuition fees** do not deter students from studying. The latest study, conducted in Berlin in 2011 with 40,000 cases, proves exactly that (ÖVP, 148702, 2012-12-06).

Employees

Original German: Es gibt auch andere Untersuchungen, das IHS etwa hat 30 Kollektivverträge untersucht, um zu erforschen, ob sich das Senioritätsprinzip positiv auf ältere **Arbeitnehmerinnen** und **Arbeitnehmer** auswirkt. Die Wissenschaftler und Wissenschaftlerinnen sind zu dem Schluss gekommen, dass es vor allem eigene Maßnahmen für ältere **Arbeitnehmerinnen** und **Arbeitnehmer** braucht (SPÖ, 172884, 2015-10-14).

Own Translation: There are also other studies; the IHS, for example, examined 30 collective agreements to investigate whether the seniority principle has a positive effect on older **employees** *[f]* and **employees** *[m]*. The researchers *[m]* and researchers *[f]* concluded that specific measures for older **employees** *[f]* and **employees** *[m]* are needed above all else (SPÖ, 172884, 2015-10-14).

Educators

Original German: Zum Schluss appelliere ich an den Wissenschaftler in Ihnen, Herr Bundesminister Faßmann: Verlassen Sie bitte den Boden der wissenschaftlichen Integrität nicht! Machen Sie bitte Politik auf Basis von Fakten und bildungswissenschaftlichen Erkenntnissen und Grundlagen, und bitte schüren Sie nicht Ängste von Eltern und **Pädagoginnen** und **Pädagogen**, indem Sie populistische Ansagen machen (SPÖ, 190865, 2017-12-21).

Own Translation: Finally, I appeal to the scientist in you, Federal Minister Faßmann: please do not abandon scientific integrity! Please base your policies on facts and educational science findings and principles, and please do not stir up fears among parents and **educators** *[f]* and **educators** *[m]* by making populist statements (SPÖ, 190865, 2017-12-21).

True-cost pricing

Original German: Wir reden von **Kostenwahrheit**. Ich kann mich erinnern, die Grünen haben vor zehn Jahren massiv forciert, daß man gerade über den Verkehrs- und Energiebereich **Kostenwahrheit** ermittelt, und Ihr Vorgänger, Kollege Streicher, hat damals auch eine solche Studie anfertigen lassen und sehr, sehr wichtiges Datenmaterial im Zusammenhang mit Energie und Verkehrsinfrastruktur errechnen lassen (Grüne, 46958, 1996-10-02).

Own Translation: We are talking about **true-cost pricing**. I remember that ten years ago, the Green Party pushed hard for **true-costs** to be determined, particularly in the transport and energy sectors, and your predecessor, colleague Streicher, also commissioned a study at that time and had very important data calculated in connection with energy and transport infrastructure (Grüne, 46958, 1996-10-02).

Foreigners (Example 1)

Original German: Es ist evident, dass die **Ausländer** aus dem Sozialtopf mehr herausnehmen, als sie einbezahlen. [...] Es gibt eine Studie des Wirtschaftsforschungsinstituts von Frau Julia Bock-Schappelwein, die bereits im Jahr 2004 über diese negative Ausländerbilanz berichtet hat (FPÖ, 32698, 2007-03-30).

Own Translation: It is evident that **foreigners** take more out of the social welfare pot than they pay in. [...] There is a study by Julia Bock-Schappelwein's Economic Research Institute, which reported on this negative **foreigner** balance as early as 2004 (FPÖ, 32698, 2007-03-30).

Foreigners (Example 2)

Original German: Es möge doch endlich einmal eine Studie gemacht werden, aus der hervorgeht, wie viel die **Ausländer** das Sozialsystem wirklich kosten. Sie alle, alle vier Fraktionen, wie Sie hier sitzen – Rot, Schwarz, Grün und Orange –, haben dagegen gestimmt. Es interessiert Sie nicht, was die **Ausländer** das Sozialsystem kosten. Es ist Ihnen völlig egal, denn bezahlen müssen es dann die kleinen Pensionisten (FPÖ, 38844, 2007-12-05).

Own Translation: A study shall be conducted to determine how much **foreigners** really cost the social welfare system. All four political parties represented here – red, black, green and orange – voted against this. You are not interested in how much **foreigners** cost the social welfare system. You don't care at all, because it is the small pensioners who have to pay for it (FPÖ, 38844, 2007-12-05).

Foreigners (Example 3)

Original German: [...] also sehr wohl die **Ausländer** aus dem Sozialsystem weit mehr herausnehmen, als sie hineinbezahlen, wie es auch viele internationale Studien belegen (FPÖ, 151017, 2013-03-21).

Own Translation: [...] indeed **foreigners** take far more out of the social welfare system than they pay into it, as many international studies have shown (FPÖ, 151017, 2013-03-21).

Leftists (Example 1)

Original German: All die **linken** Promigrationsfetischisten tragen ein gehöriges Maß an Mitschuld für diese Gewaltepидemie gegen Frauen in Europa. [...] In Ihrer ideologischen Verblendung sind Sie ja nicht einmal in der Lage, Zahlen, Daten und Fakten anzuerkennen (FPÖ, 213790, 2020-12-10).

Own Translation: All the **leftist** pro-migration fetishists bear a considerable share of the

blame for this epidemic of violence against women in Europe. [...] In your ideological blindness, you are not even capable of acknowledging numbers, data and facts (FPÖ, 213790, 2020-12-10).

Leftists (Example 2)

Original German: Diese Studie zum politischen Verhalten wurde nicht nur von Frau Präsidentin Prammer, sondern unter anderem auch von der Frau Bundesministerin für Unterricht in Auftrag gegeben – und jetzt kommt natürlich sofort das Zurückrudern. Wo waren denn die Bestrebungen, wenn bei Demonstrationen von der **linken** Seite die wahren Gewalttäter in dieser Republik unschuldige Menschen, politische Gegner verletzt haben? – Stillschweigen. Die ganze Community in der Medienlandschaft zeigte überhaupt keine Reaktion (FPÖ, 113939, 2009-05-19).

Own Translation: This study on political behaviour was commissioned not only by President Prammer, but also by the Federal Minister of Education, among others – and now, of course, there is immediate backtracking. Where were the efforts when, during demonstrations by the **leftists**, the real perpetrators of violence in this republic injured innocent people and political opponents? – Silence. The entire media community showed no reaction whatsoever (FPÖ, 113939, 2009-05-19).

Evidence (Example 1)

Original German: Es soll in Zukunft – und auch das war leider in diesem Hohen Haus wie in allen Parlamenten nicht immer der Fall – die wissenschaftliche **Evidenz** als sachliche Grundlage für die Klimapolitik gelten. Es geht nicht mehr um das Bauchgefühl, das man hat, wenn man aus der Diskussion rausgeht, es geht nicht um Geschichten, die man vielleicht irgendwo gehört hat, sondern es geht tatsächlich um das Prüfen wissenschaftlicher Erkenntnis und die Fragestellung, was das für unser Land bedeutet (NEOS, 204566, 2019-09-25).

Own Translation: In the future – and that is unfortunately something that has not always been the case in this House, as in all parliaments – scientific **evidence** should serve as the factual basis for climate policy. It is no longer about the gut feeling you have when you leave the discussion, it is not about stories you may have heard somewhere, but it is actually about examining scientific knowledge and asking what this means for our country (NEOS, 204566, 2019-09-25).

Evidence (Example 2)

Original German: Das ist die wissenschaftliche **Evidenz** [...] Noch einmal: Es gibt zwei bis drei Tote durch Passivrauchen in Österreich pro Tag, das ist wissenschaftlich erwiesen. [...] Sie entscheiden sich fürs Sterben und für Ihre parteitaktische Linie. Das ist meines Erachtens nicht in Ordnung (NEOS, 191376, 2018-02-28).

Own Translation: That is the scientific **evidence** [...] Once again: there are two to three deaths per day in Austria due to passive smoking; that has been scientifically proven. [...] You are choosing death and your party's tactical line. In my opinion, that is not right (NEOS, 191376, 2018-02-28).