

Public Responses to Jihadist Terrorism on Social Media

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Appendix

A) Supplementary Methodological Information

The main analyses were conducted in R 4.4.1 in September 2024, and rerun in June 2026. The code underlying the analysis is available at: <https://doi.org/10.17605/OSF.IO/HFJ7Y>.

Data Scraping. All original (non-retweet), language-matched Tweets posted within the seven days after each attack and containing at least one of a set of migration-related terms were retrieved using the Twitter Academic API and the `academictwitterR` between December 2022 and January 2023 (Barrie and Ho 2021). Each term was queried both as a plain word and as a hashtag. For English, the search query was: migration OR immigration OR migrant OR immigrant OR foreigner OR migrants OR immigrants OR foreigners OR refugee OR refugees OR asylum OR islam OR muslim OR muslims OR islamist OR islamism OR salafist OR salafism OR jihad, with the corresponding hashtag for each term (e.g. #migration) also included. The French, German, and Spanish corpora were collected in the same way, using terms translated by native speakers. Users were assigned to the city of each attack by a case-insensitive match of the city name to the profile location field, in English and the native language spelling where applicable. This misses users who did not add information about their city in their profile. Importantly, there is no reason to assume that this is systematically biasing the results. If anything, existing research indicates that potential bias would likely be higher for geolocated Tweets, as less than 1 percent of all Tweets are geotagged, whereas more than 40 percent of Twitter users reported valid city-level locations in their profiles (Mahmud, Nichols, and Drews 2014).

Data Preprocessing. Tweets were lowercased; hashtag symbols were removed while the hashtag word was kept, @-mentions, URLs, punctuation, numbers, and symbols were removed. Stop words were removed using the Snowball and stopwords-iso lists for the respective language. Remaining tokens were stemmed with the language-specific Snowball stemmer. Exact-duplicate Tweets (identical text) were removed before estimation. Duplicate shares were small, between roughly 0.15% and 1.12% across languages. Closer examination revealed that these Tweets are mostly quotes and excluding them does not affect the results. The same preprocessing steps were applied to every language, differing only in the language argument. For these steps, I used `quanteda` 4.1 together with the stopwords 2.3 word lists and the `SnowballC` 0.7.1 stemmer, data handling and figures used `dplyr` 1.1.4, `tidyr` 1.3.1, and `ggplot2` 3.5.1 (Benoit et al. 2018).

Topic Estimation. Keyword-assisted topic models were estimated with `keyATM` 0.5.2 and the covariate model (Eshima, Imai, and Sasaki 2024). Each language model included the four keyword (seeded) topics and twenty additional non-keyword topics. Models were estimated separately by language with 500 collapsed Gibbs-sampling iterations, a random seed of 1337, and a topic-word (beta) prior of 0.8, the remaining priors were left at the package defaults. Convergence was confirmed for all four languages: Figure A5 shows that, for each language, the log-likelihood rises and then plateaus. Perplexity falls and then stabilizes well before the final (500th) iteration. Alternative methods, such as `BERTopic` with Seed Words, were not feasible, as this approach currently does not allow adding document-level covariates to the model, which is a key interest of this study.

Topic Validation. The keyword topics were validated using GPT-3.5-turbo-0125 in September 2024 using the `chatgpt` package 0.2.3 (Rodriguez 2023). For each topic-language combination, the 150 most representative Tweets (by the document-topic distribution) were classified as matching the topic. The model received a fixed instruction defining it as a classifier that must reply with "1" or "0", followed by a language-specific prompt asking whether the tweet signals the topic in question. Each tweet was submitted as an independent request, with the session reset beforehand so that no conversation history carried over. The sampling parameters were left at the package defaults (temperature = 1, top-p = 1, maximum tokens = 256). The labels were additionally checked by the author. The agreement between

the keyATM top-topic Tweets and the GPT classification (the share of the 150 Tweets labelled 1) is reported in Table A1.

Literature

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Figure A1: Topic proportions English

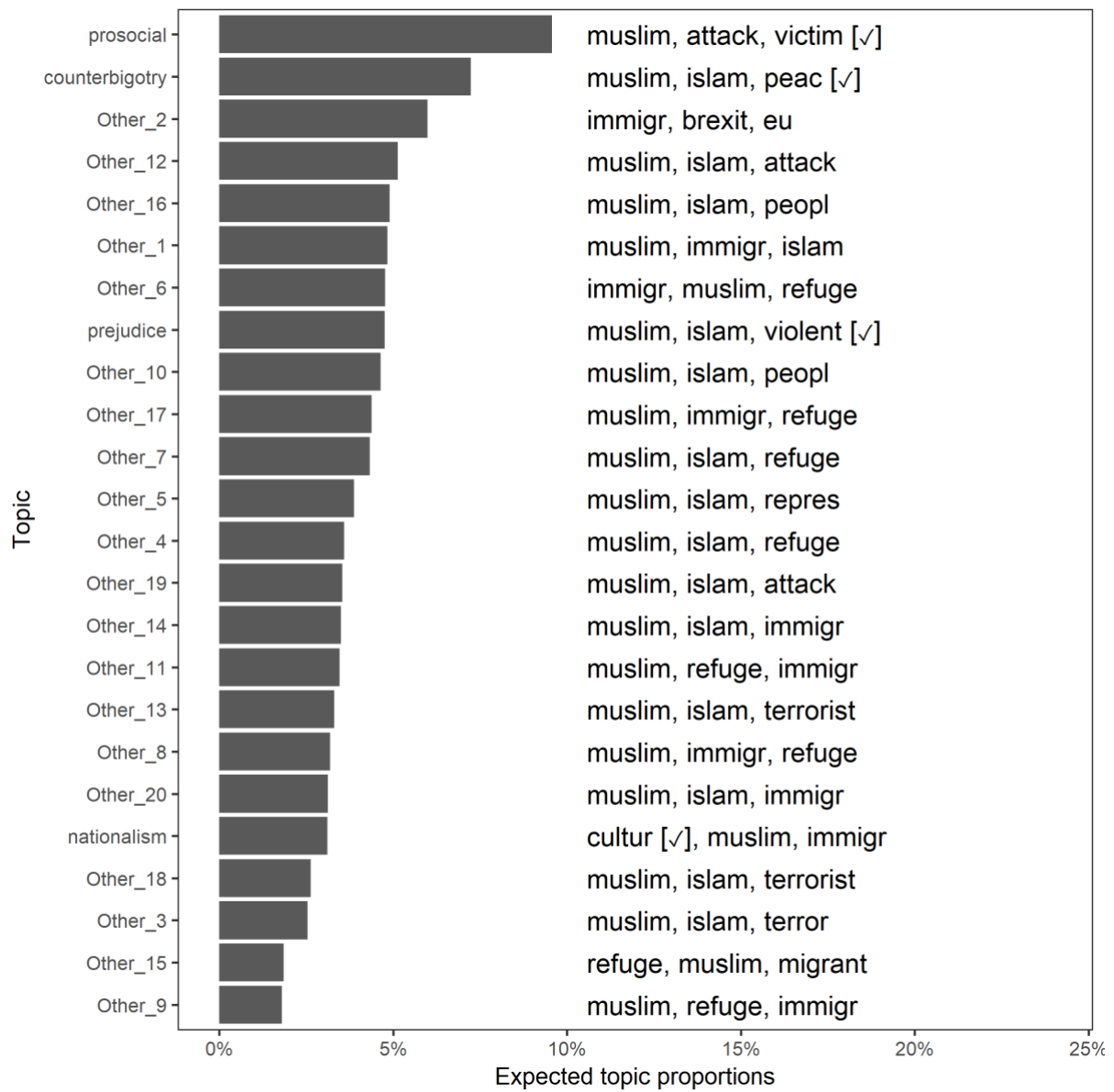


Figure A2: Topic proportions French

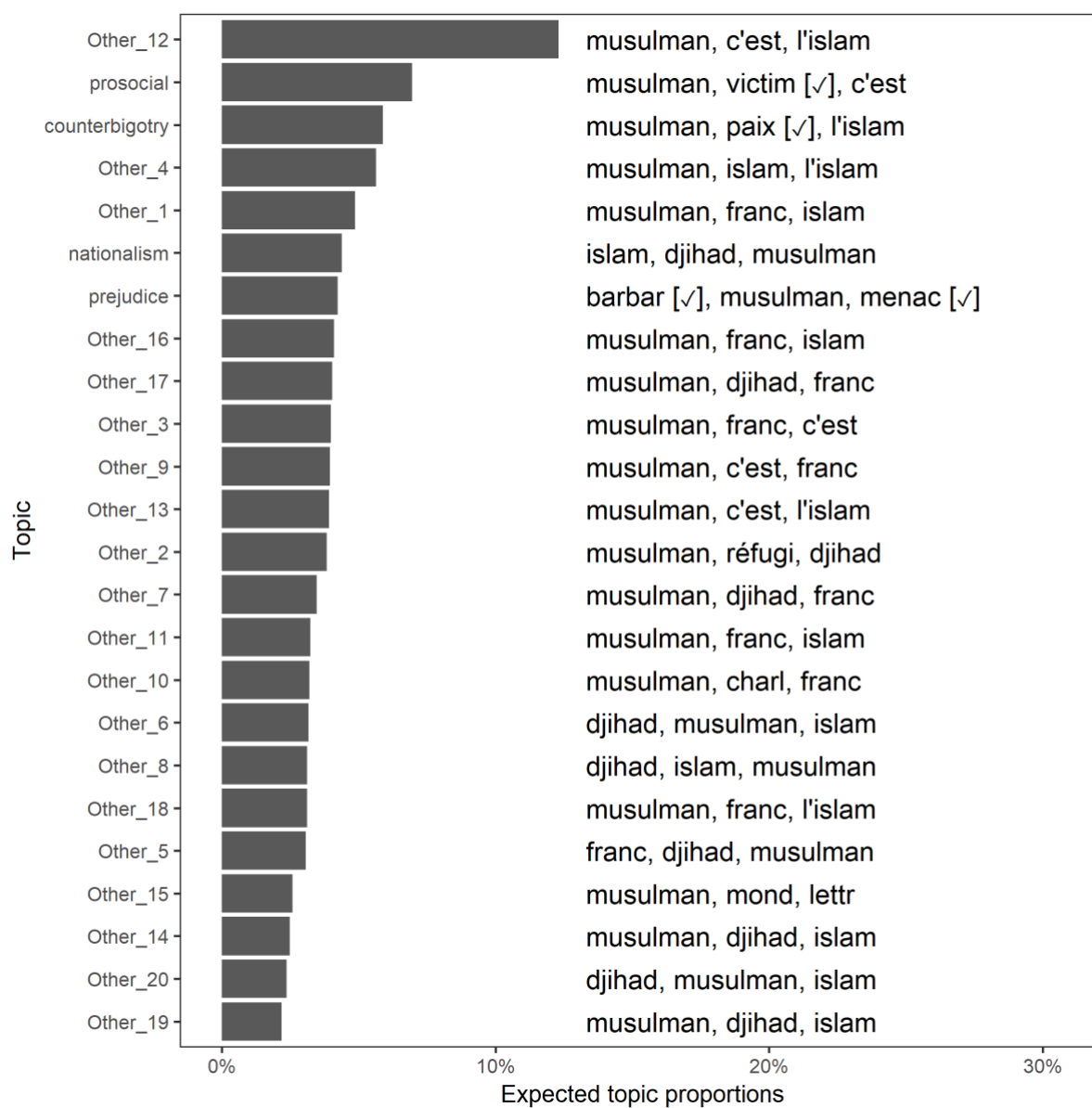


Figure A3: Topic proportions German

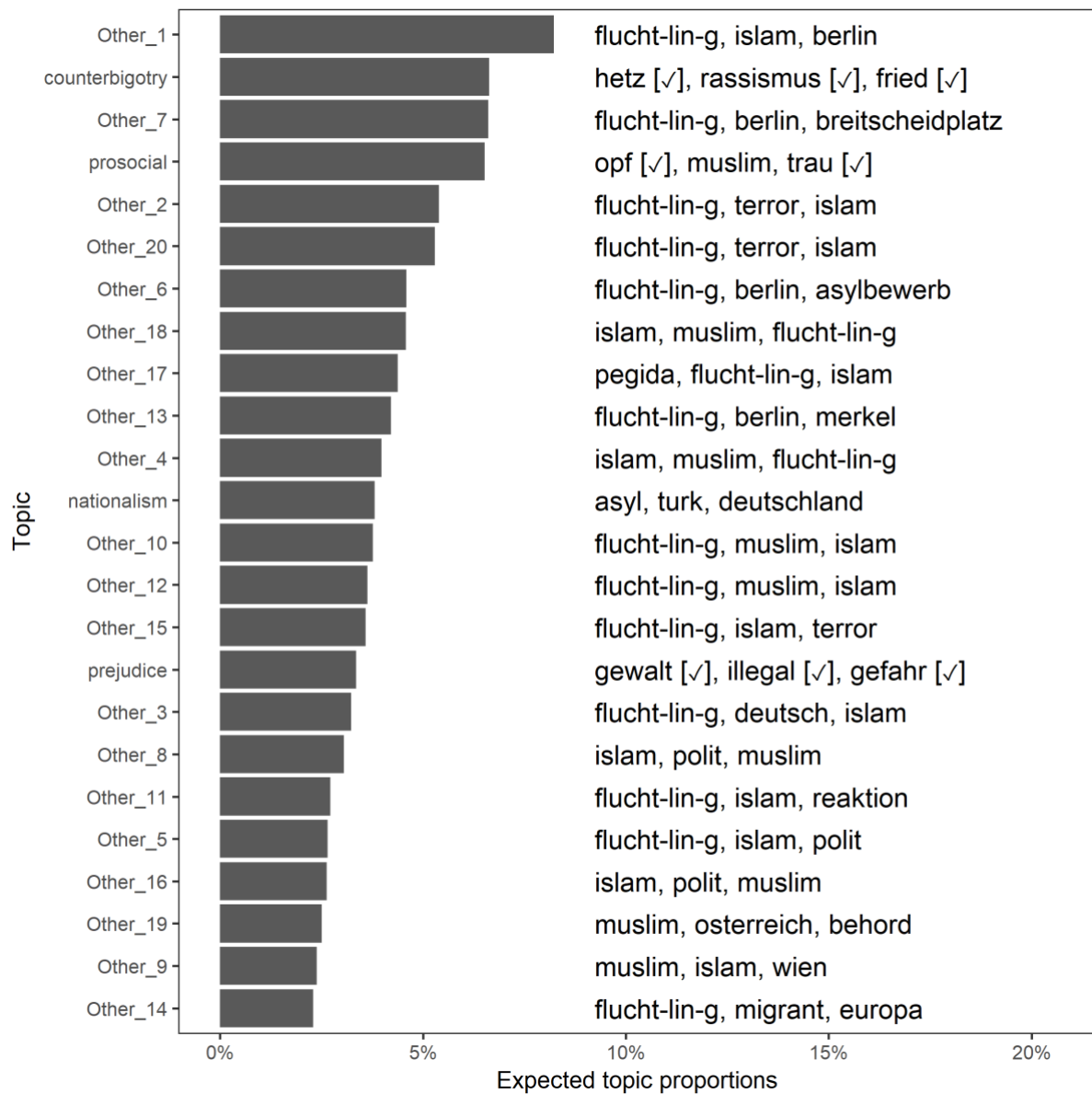


Figure A4: Topic proportions Spanish

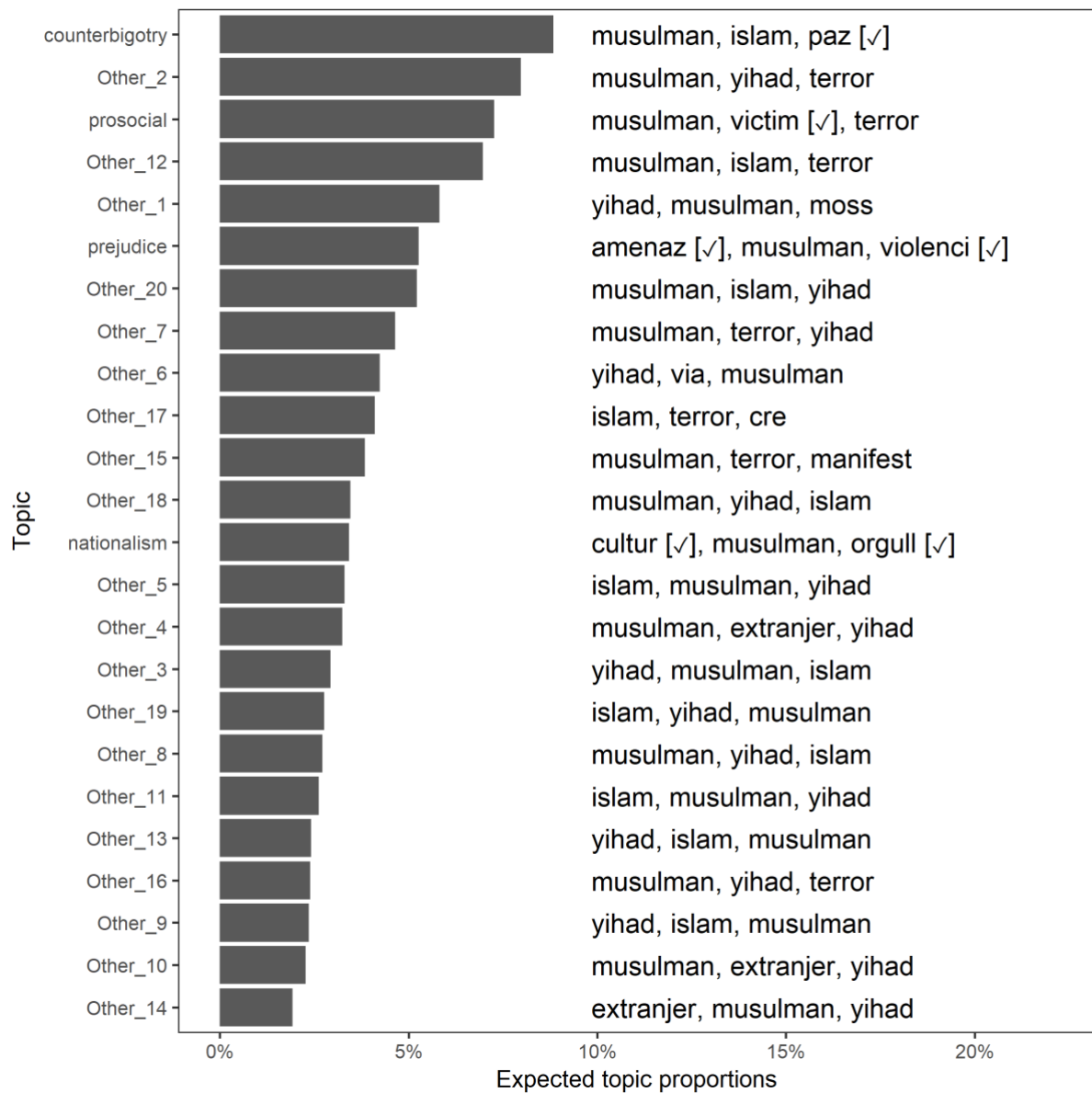


Figure A5: keyATM model fit by language

keyATM model fit by language (convergence check)

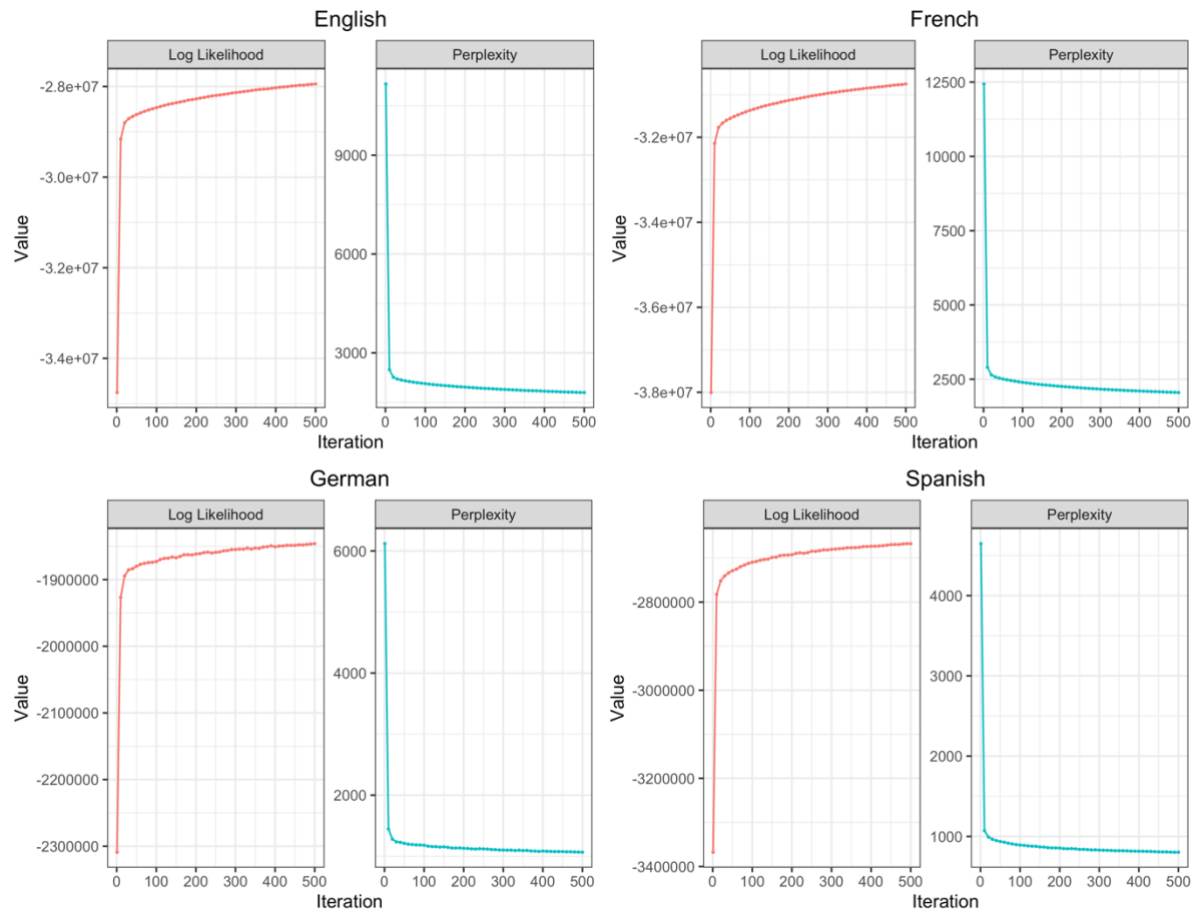
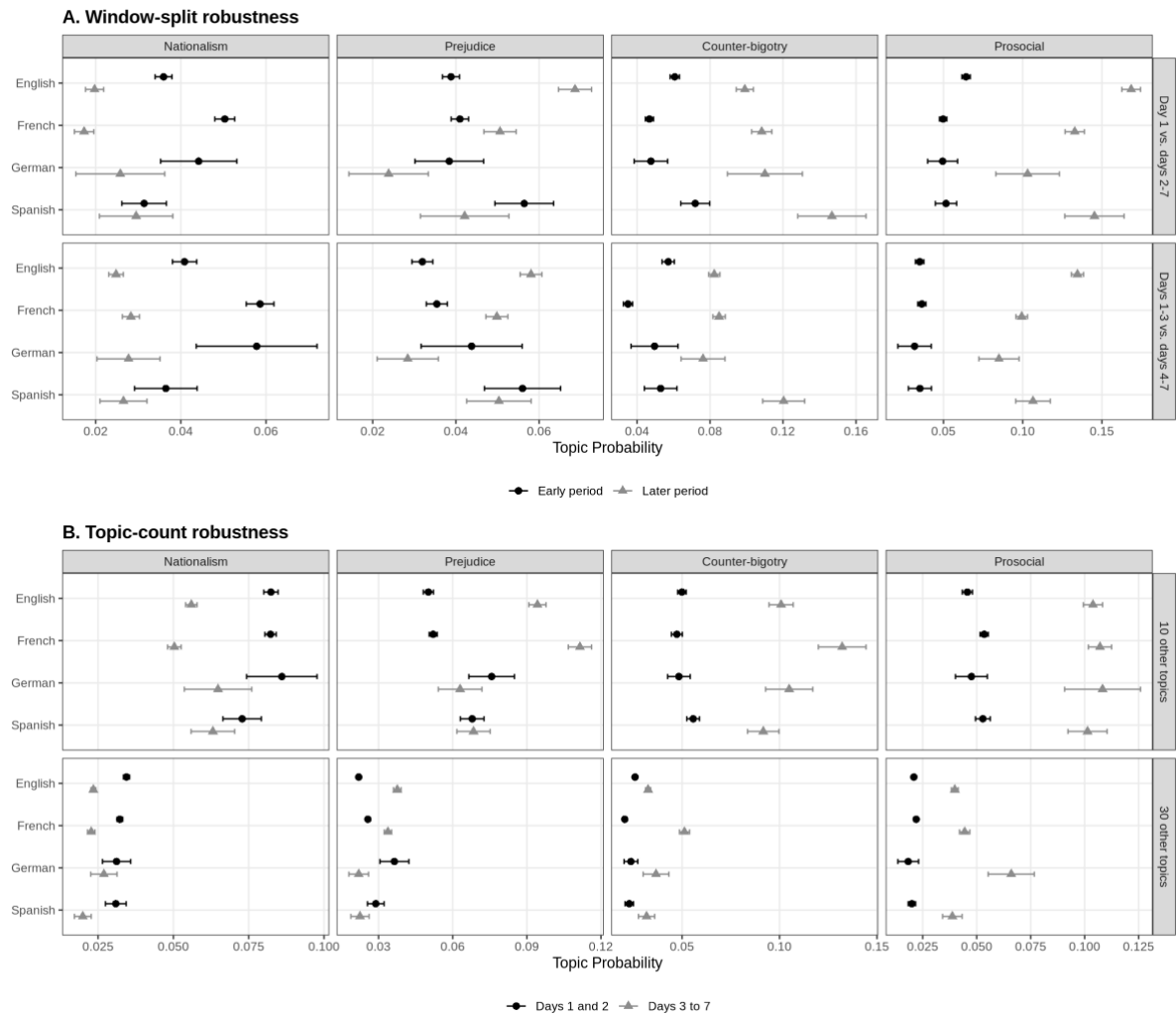


Figure A6: Robustness of the temporal pattern to (A) the choice of time window and (B) the number of topics.



Note: Points are estimated topic probabilities with 90% credible intervals.

Table A1: Validation of key topics

	Topic 1:	Topic 2:	Topic 3:	Topic 4:
	Nationalism	Prejudice	Counter- bigotry	Prosocial
English	0.49	0.79	0.67	0.63
French	0.64	0.89	0.67	0.49
German	0.83	0.89	0.74	0.5
Spanish	0.75	0.87	0.87	0.63

*Note: For each topic, the 150 Tweets with the highest estimated probability were classified by GPT.
Cells report the share GPT assigned to the same topic.*

Table A2.1: All English topics

1_nationalism	2_prejudice	3_counterbigotry	4_prosocial	Other_1	Other_2
cultur [✓]	muslim	muslim	muslim	muslim	immigr
muslim	islam	islam	attack	immigr	brexit
immigr	violent [✓]	peac [✓]	victim [✓]	islam	eu
islam	violenc [✓]	love [✓]	london	refuge	refuge
refuge	true	racist [✓]	islam	attack	muslim
migrat	call	peopl	terror	brexit	migrant
tradit [✓]	rape	religion	terrorist	migrant	migrat
migrant	crimin [✓]	terrorist	peopl	peopl	vote
religion	threat [✓]	terror	westminst	countri	foreign
chang	illeg [✓]	hate	communiti	british	leav
Other_3	Other_4	Other_5	Other_6	Other_7	Other_8
muslim	muslim	muslim	immigr	muslim	muslim
islam	islam	islam	muslim	islam	immigr
terror	refuge	repres	refuge	refuge	refuge
refuge	peopl	peopl	eu	migrant	migrant
attack	attack	attack	migrant	immigr	islam
action	kill	terrorist	islam	peopl	migrat
london	terrorist	terror	migrat	attack	vote
condemn	london	immigr	brexit	fear	brexit
terrorist	terror	london	contribut	terror	asylum
pls	immigr	cox	economi	islamist	eu
Other_9	Other_10	Other_11	Other_12	Other_13	Other_14
muslim	muslim	muslim	muslim	muslim	muslim
refuge	islam	refuge	islam	islam	islam
immigr	peopl	immigr	attack	terrorist	immigr
islam	terrorist	islam	terrorist	peopl	refuge
migrant	kill	migrant	peopl	attack	peopl
migrat	attack	migrat	london	terror	terror
stori	terror	asylum	immigr	kill	attack
asylum	london	contribut	terror	british	migrat
brexit	christian	london	kill	london	terrorist
support	immigr	news	islamist	ramadan	read
Other_15	Other_16	Other_17	Other_18	Other_19	Other_20
refuge	muslim	muslim	muslim	muslim	muslim
muslim	islam	immigr	islam	islam	islam
migrant	peopl	refuge	terrorist	attack	immigr
boat	terrorist	islam	immigr	bridg	refuge
islam	immigr	migrant	peopl	women	london
rescu	terror	migrat	fuck	westminst	peopl
rais	attack	eu	alex	condemn	migrant
immigr	christian	vote	jone	london	terror
target	islamist	asylum	attack	gather	attack
med	kill	women	refuge	terrorist	islamist

Table A2.2: All French topics

1_nationalism	2_prejudice	3_counterbigotry	4_prosocial	Other_1	Other_2
islam	barbar [✓]	musulman	musulman	musulman	musulman
djihad	musulman	paix [✓]	victim [✓]	franc	réfugi
musulman	menac [✓]	l'islam	c'est	islam	djihad
franc	l'islam	c'est	pens [✓]	djihad	syrien
cultur [✓]	islam	religion	l'islam	c'est	franc
anonymous	franc	terror	terror	l'islam	islam
sit	violenc [✓]	islam	islam	terror	terror
l'islam	terror	racist [✓]	franc	charl	l'islam
charl	criminel [✓]	juif	charliehebdo	paris	paris
jihad	acte	franc	qu'il	hebdo	attentat
Other_3	Other_4	Other_5	Other_6	Other_7	Other_8
musulman	musulman	franc	djihad	musulman	djihad
franc	islam	djihad	musulman	djihad	islam
c'est	l'islam	musulman	islam	franc	musulman
l'islam	franc	réfugi	terror	islam	franc
islam	c'est	islam	jihad	l'islam	jihad
terror	terror	jihad	franc	étranger	attentat
juif	djihad	attentat	drogu	c'est	paris
charl	charl	étranger	captagon	réfugi	terror
djihad	étranger	terror	publ	charl	salaf
qu'il	charliehebdo	paris	fatw	terror	étranger
Other_9	Other_10	Other_11	Other_12	Other_13	Other_14
musulman	musulman	musulman	musulman	musulman	musulman
c'est	charl	franc	c'est	c'est	djihad
franc	franc	islam	l'islam	l'islam	islam
islam	islam	djihad	islam	islam	franc
l'islam	l'islam	étranger	terror	terror	jihad
djihad	charliehebdo	c'est	franc	franc	c'est
terror	caricatur	l'islam	qu'il	djihad	l'islam
qu'il	étranger	terror	djihad	qu'il	moder
faut	hebdo	attentat	fair	tu	sit
fair	daesh	polit	faut	fair	fair
Other_15	Other_16	Other_17	Other_18	Other_19	Other_20
musulman	musulman	musulman	musulman	musulman	djihad
mond	franc	djihad	franc	djihad	musulman
lettr	islam	franc	l'islam	islam	islam
franc	fair	islam	islam	franc	anonymous
islam	djihad	jihad	c'est	terror	franc
bidar	l'islam	paris	terror	l'islam	compt
abdenmour	attentat	attentat	djihad	c'est	twitt
l'islam	daesh	terror	lieux	jihad	paris
djihad	réform	l'islam	cult	réfugi	sit
juif	théolog	lassan	étranger	étranger	l'islam

Table A2.3: All German topics

1_nationalism	2_prejudice	3_counterbigotry	4_prosocial	Other_1	Other_2
asyl	gewalt [✓]	hetz [✓]	opf [✓]	fluchtling	fluchtling
turk	illegal [✓]	rassismus [✓]	muslim	islam	terror
deutschland	gefahr [✓]	fried [✓]	trau [✓]	berlin	islam
stolz [✓]	muslim	muslim	gedenk [✓]	asylbewerb	fakt
turkei	fluchtling	islam	islam	muslim	merkel
beantrag	migration	lieb [✓]	berlin	anschlag	faktencheck
muslim	einwander	islamismus	fluchtling	terror	religion
fluchtling	asyl	fluchtling	anschlag	terrorist	berlin
islam	wien	terror	islamist	breitscheidplatz	terrorismus
land	turkisch	glaub	terror	deutschland	islamismus
Other_3	Other_4	Other_5	Other_6	Other_7	Other_8
fluchtling	islam	fluchtling	fluchtling	fluchtling	islam
deutsch	muslim	islam	berlin	berlin	polit
islam	fluchtling	polit	asylbewerb	breitscheidplatz	muslim
grun	islamismus	islamismus	islam	anschlag	fluchtling
islamismus	terror	wien	breitscheidplatz	fahr	turkisch
muslim	berlin	terror	falsch	lkw	wien
migrant	polit	pass	mosche	islam	gesellschaft
probl	europa	muslim	syst	merkel	terrorist
migration	islamist	speziell	islamismus	weihnachtsmarkt	jung
deutschland	unterschied	spd	terror	muslim	moslem
Other_9	Other_10	Other_11	Other_12	Other_13	Other_14
muslim	fluchtling	fluchtling	fluchtling	fluchtling	fluchtling
islam	muslim	islam	muslim	berlin	migrant
wien	islam	reaktion	islam	merkel	europa
islamismus	polit	anschlag	migration	breitscheidplatz	muslim
fluchtling	wien	asyl	asyl	attentat	polit
moslem	ausland	dringend	flucht	munition	asyl
polizei	terroranschlag	muslim	freundin	muslim	migration
europa	extremist	person	bekomm	wien	thema
regier	klar	wahl	schwer	gefluchtet	illegal [2]
sieh	verurteil	mosl	gefluchtet	kauf	jahrig
Other_15	Other_16	Other_17	Other_18	Other_19	Other_20
fluchtling	islam	pegida	islam	muslim	fluchtling
islam	polit	fluchtling	muslim	osterreich	terror
terror	muslim	islam	fluchtling	behord	islam
merkel	islamismus	afd	moslem	wien	muslim
asyl	islamist	asyl	wien	islamist	berlin
religion	terror	npd	terrorist	tat	schutz
islamismus	migration	berlin	leut	munition	ausland
fakt	land	deutsch	terror	slowakei	land
faktencheck	turkei	asylbewerb	religion	kauf	terroranschlag
muslim	saudi	deutschland	christ	berlin	islamismus

Table A2.4: All Spanish topics

1_nationalism	2_prejudice	3_counterbigotry	4_prosocial	Other_1	Other_2
cultur [✓]	amenaz [✓]	musulman	musulman	yihad	musulman
musulman	musulman	islam	victim [✓]	musulman	yihad
orgull [✓]	violenci [✓]	paz [✓]	terror	moss	terror
islam	islam	terror	islam	via	atent
inmigr	violent [✓]	racist [✓]	yihad	polic	barcelon
necesit	yihad	religion	barcelon	atent	islam
abraz	terror	barcelon	dolor [✓]	barcelon	via
padr	atent	racism [✓]	refugi	alert	celul
años	vide	amor [✓]	atent	investig	comun
muert	criminal [✓]	yihad	gent	terror	ripoll
Other_3	Other_4	Other_5	Other_6	Other_7	Other_8
yihad	musulman	islam	yihad	musulman	musulman
musulman	extranjer	musulman	via	terror	yihad
islam	yihad	yihad	musulman	yihad	islam
terror	islam	atent	terror	atent	extranjer
celul	cataluñ	terror	iman	via	odi
extranjer	salaf	pregunt	celul	barcelon	habl
refugi	inmigr	barcelon	extranjer	cre	refugi
inmigr	polit	exig	islam	islam	terror
via	terror	compart	abat	rambl	sig
español	radical	pais	madr	arrepient	masacr
Other_9	Other_10	Other_11	Other_12	Other_13	Other_14
yihad	musulman	islam	musulman	yihad	extranjer
islam	extranjer	musulman	islam	islam	musulman
musulman	yihad	yihad	terror	musulman	yihad
terror	islam	extranjer	yihad	inmigr	islam
atent	muj	moss	atent	marroqu	inmigr
refugi	refugi	nacional	refugi	años	moz
explos	mat	investig	pais	catalan	terror
barcelon	español	refugi	extranjer	terror	cas
extranjer	pais	polic	pas	atent	independent
via	jov	terror	barcelon	ataqu	mujer
Other_15	Other_16	Other_17	Other_18	Other_19	Other_20
musulman	musulman	islam	musulman	islam	musulman
terror	yihad	terror	yihad	yihad	islam
manifest	terror	cre	islam	musulman	yihad
barcelon	yih	frent	españ	terror	terror
islam	barcelon	pasal	via	refugi	mat
comun	cataluny	accion	acus	famili	gent
atent	extranjer	eficaz	atent	barcelon	atent
conden	deten	musulman	ayud	inmigr	cre
cataluñ	islam	yihad	terror	religion	barcelon
antecedent	español	via	arab	problem	inmigr