

Physical changes and risks to humans: Explaining what people in four European countries associate with climate change

E. Tvinnereim, C. Mays, A. Arnold, R. Bertholdo, W. Poortinga, N. Pidgeon

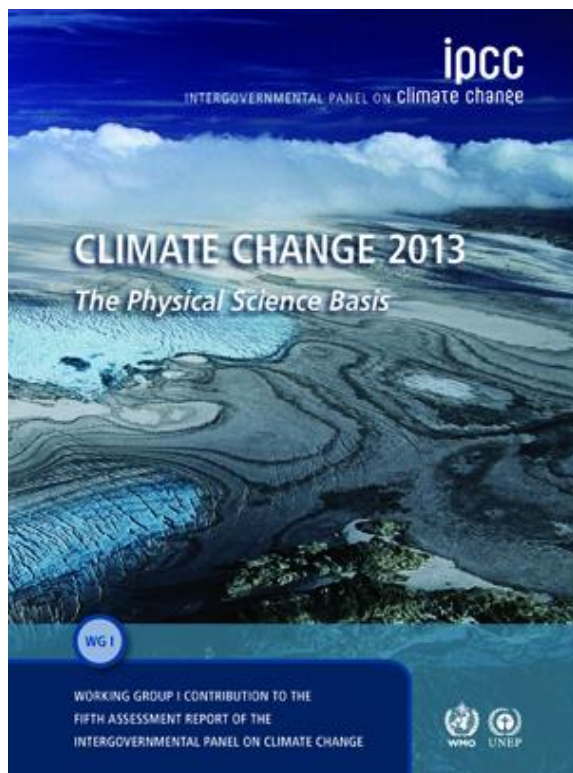
Digsscore/Energy Lab/CET lunch

Research questions

- How do various segments of the public perceive the effects of climate change?
- How do perceptions vary across countries?
- How do associations with climate change co-vary with opinions about other matters?
- How can open-ended questions aid research on climate risk perceptions?



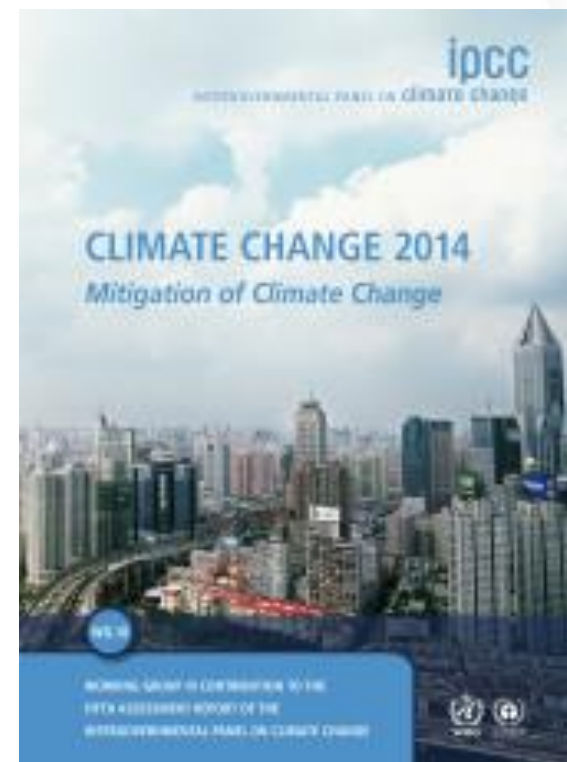
Climate change: IPCC classification



Physical sciences



Impacts & adaptation



Mitigation

Open-ended questions today

- Limitations to closed questions
 - Science/technology: Complex, potentially unformed opinions (Stoneman 2012)
 - What is important to you? Implicit priority.
- Before: costly and difficult to use open-ended questions
- Now: Online surveys + quantitative text analysis + qualitative validation
- Ask at the beginning (context effects)

European Perceptions of Climate Change

Aim: Provide the first theoretically-grounded, systematic comparison of the **individual** and **socio-political** drivers of climate change and energy perceptions at the European level (UK, Germany, France, Norway).

- Conduct directly comparable nationally representative **surveys** of public opinion (our core objective).
- Carry out in-depth analyses of the **socio-political context** in each participating nation (to inform the survey design).
- Produce and disseminate (in collaboration with stakeholder panel) a series of **recommendations** for public engagement at the national and European level.

Team: Cardiff University, Wales (UK, Coordinator), University of Stuttgart (DE), Symlog Institute, Paris (FR), University of Bergen (NO), COIN (UK)

Survey questions

1. *“What first comes to mind when you hear the phrase ‘climate change’? Please tell me the words or phrases that come to mind.”*

2. *How worried, if at all, are you about climate change?*

Not at all worried - Not very worried - Fairly worried - Very worried - Extremely worried –

Don't know

Theoretical expectations

- Physical effects, human impact, skepticism (Tvinnereim&Fløttum, 2015)
 - Gender and age effects
 - Strong co-variation with “worried” variable
- Ideological (left-right) effects (Campbell, 2014; Guy, 2014; Farrell, 2016)
- Associations with “most important issue” (Kahan, 2017)



Word frequencies, effects (translation)

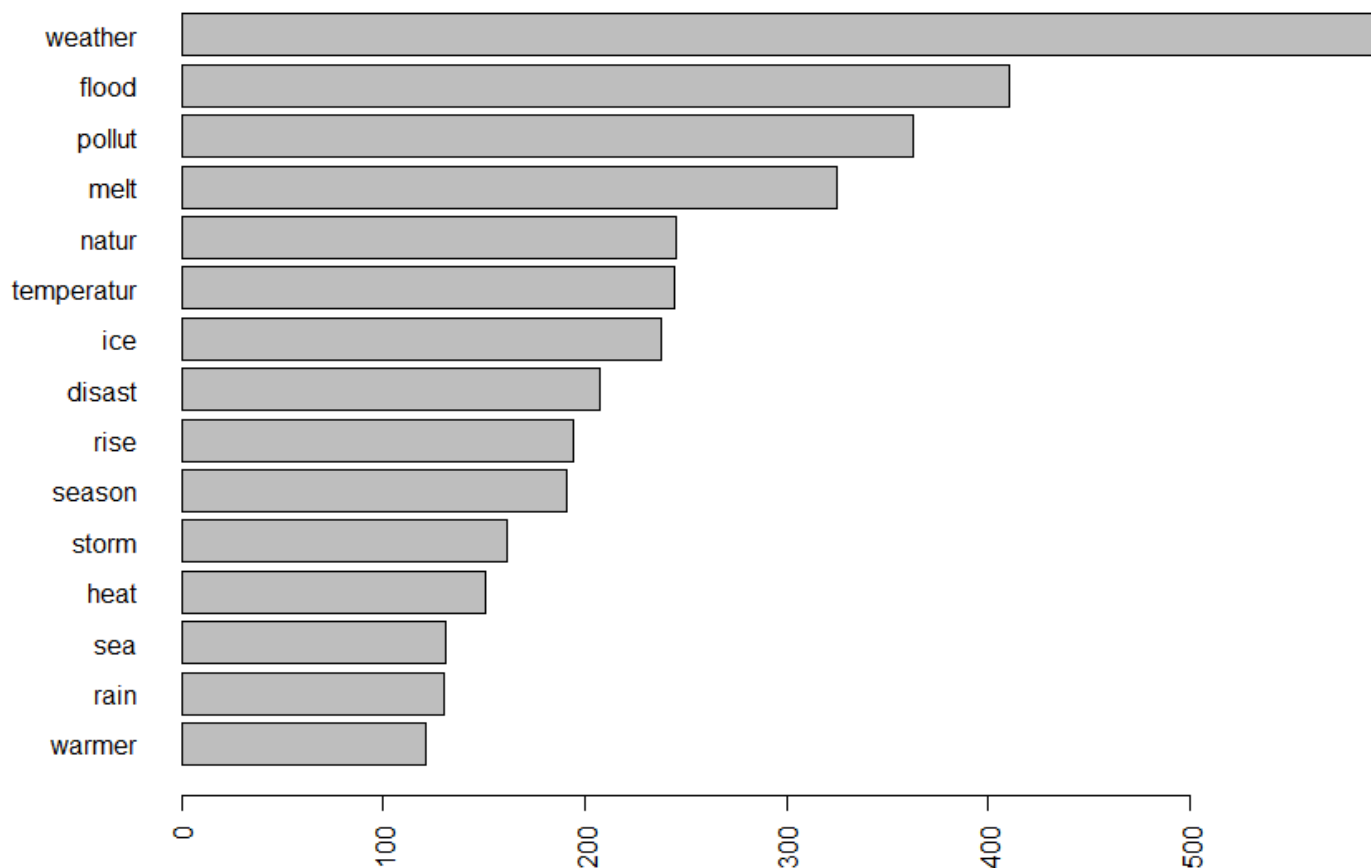


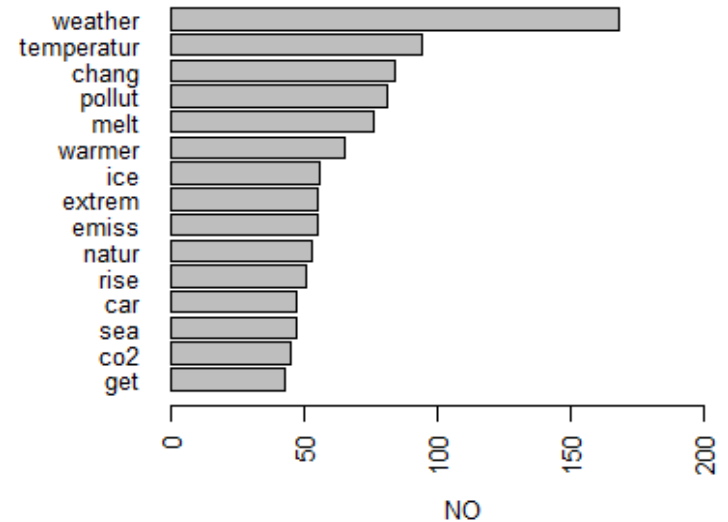
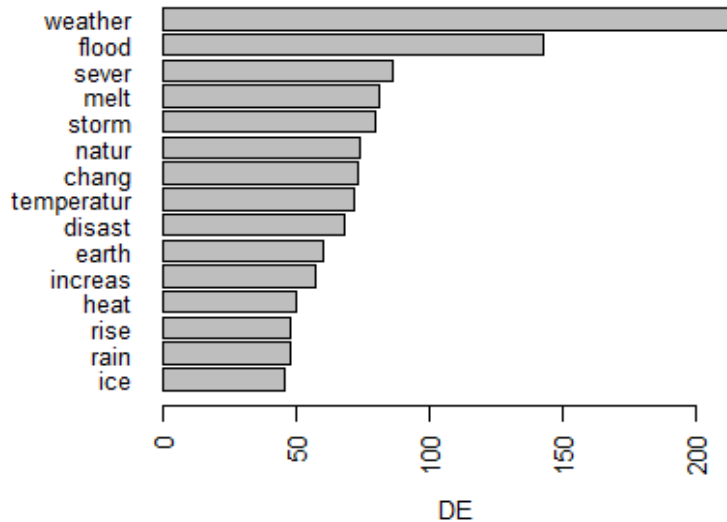
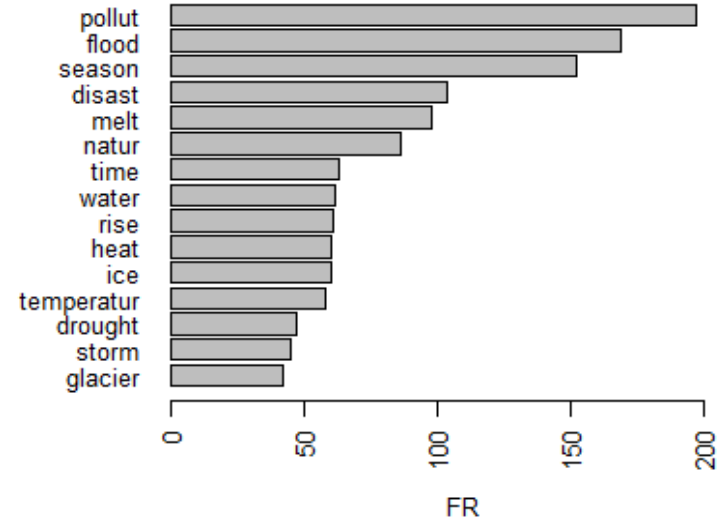
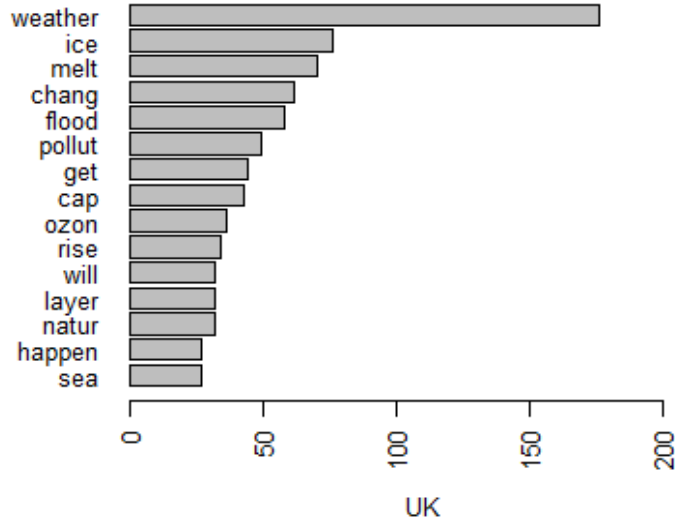
Figure 1: Most frequent words across responses in four languages. Stop words removed, along with the words/phrases directly corresponding to “climate change” and “global warming.” Words are stemmed to include different versions of the same root form; the stemmed forms are shown.

Work flow

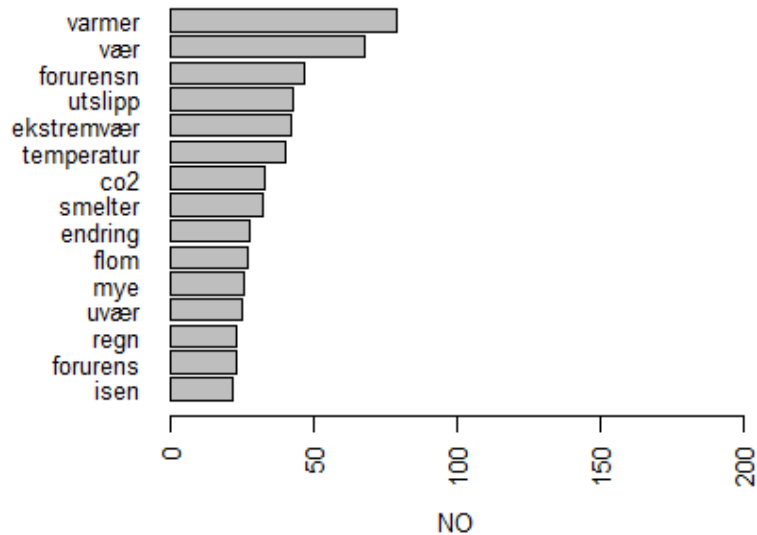
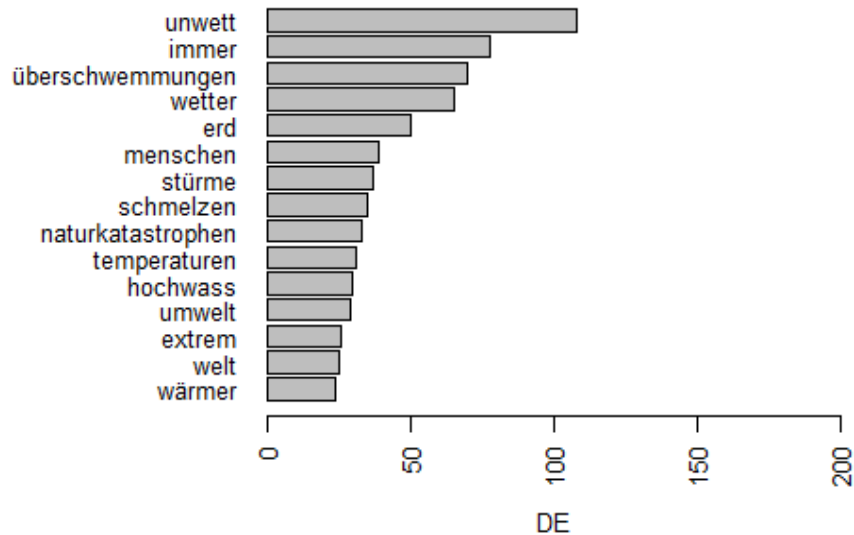
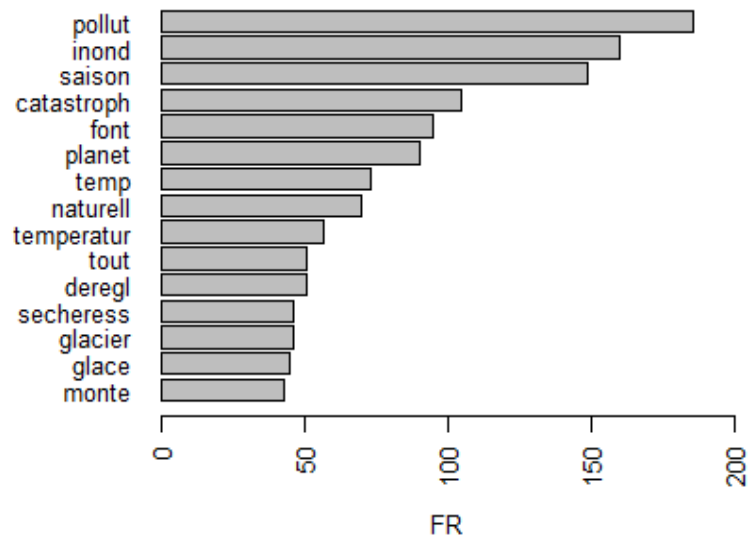
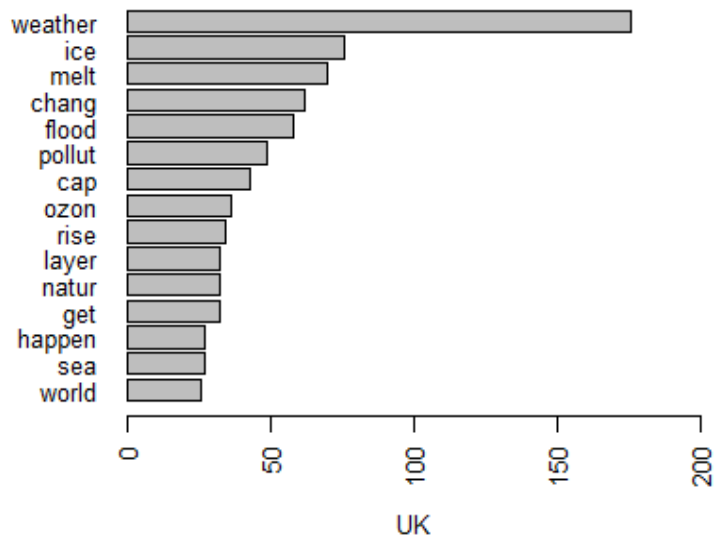
- Machine-aided (spelling) corrections
- Machine translation
- Bespoke standardization (CO2, global_warming)
- Stemming and stop word removal
- Structural topic modeling
- Qualitative assessment of 20 model runs
- Selection of best model run



Most frequent words, by country



Most frequent words, original



STM: Induced topics

Most representative terms	Suggested label	Prevalence
chang, summer, winter, climat, season, unpredict, human	Weather, seasons	0.166
disast, scare, natur, flood, great, forest, mani*	Disaster/flood	0.136
reduc, damag, pollut, carbondioxid, emiss, gas, influenc	Emissions	0.133
condit, cold, live, wors, year, peopl, heat	Extreme weather	0.117
ozon, warm, layer, will, planet, wind, happen	Ozone	0.115
ice, melt, pole, believ, age, anim, north	Ice melt	0.113
sea, level, rise, temperatur, increas, drought, world	Sea-level rise	0.112
go*, environ, less, energi, sustain, renew, water	Energy	0.109

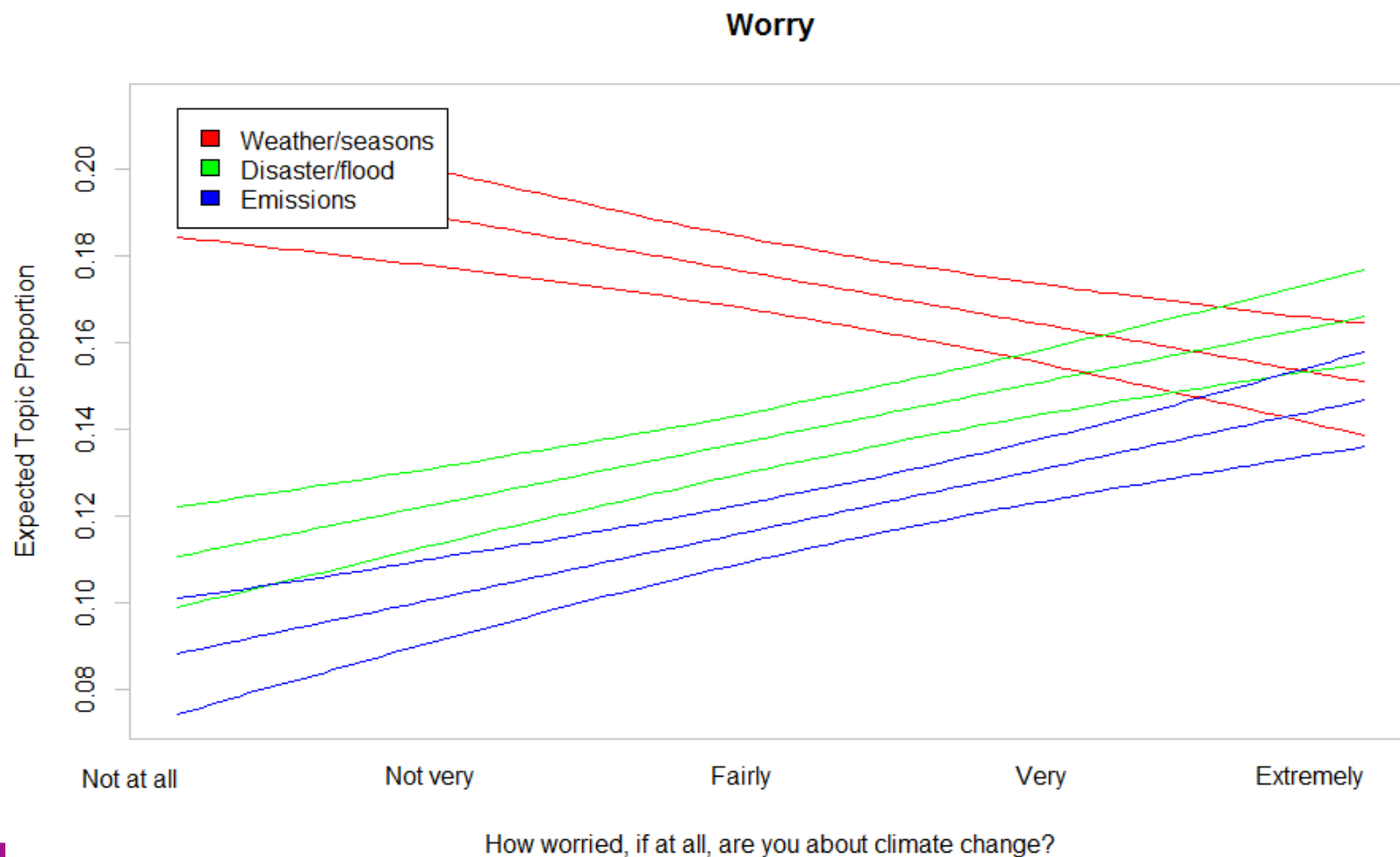
Topic 1: Most representative responses

1. Dass das Wetter sich verändert bzw. sich verschiebt und dass es auch immer mehr Unwetter gibt.
2. schlechtes wetter und verschiebung der jahreszeiten. unwetter
3. PLUS DE SAISSONS ? PLUS D ETE PLUS D HII VER /CT
4. LES SAISONS ? IL N Y A PLUS DE SAISON / CA CHANGE ILN Y A PLUS D ETE // NSP
5. klimaet er i endring, er ikke ordentlige vintre lenger
6. The change in weather patterns
7. the weather/its hit and miss/it has changed over the years we have al ot more rain. it is getting to a climaate where the weather is changing and yu an never rely on the weather forecast beause the weather changes so frequently ad it is affecting the world
8. the change in the weather and the seasons
9. change in weather paterns
10. Erderwärmung, Wetter wird immer unbeständiger, ständige Veränderung des Klimas

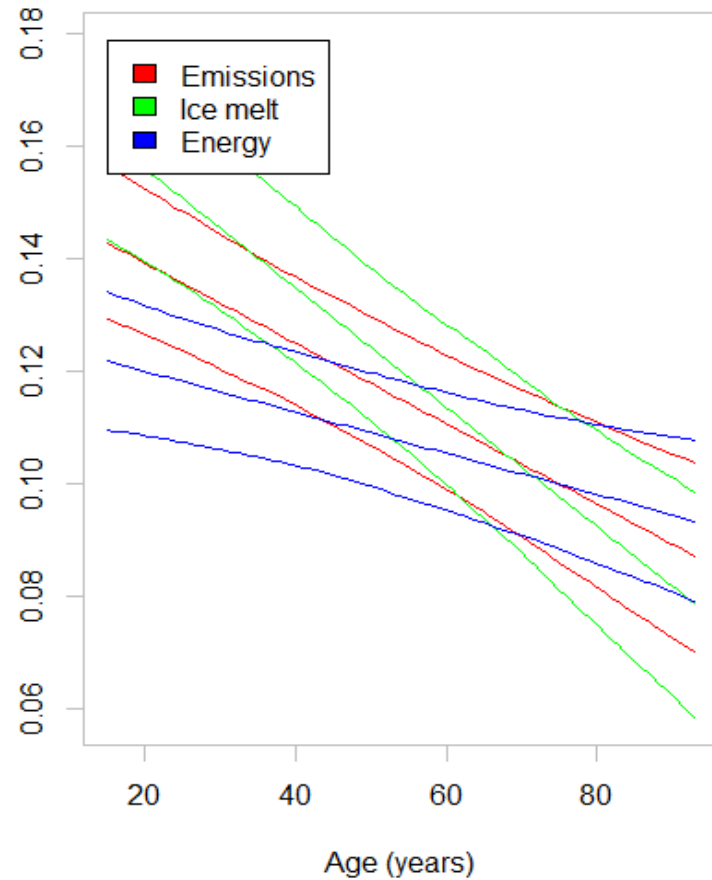
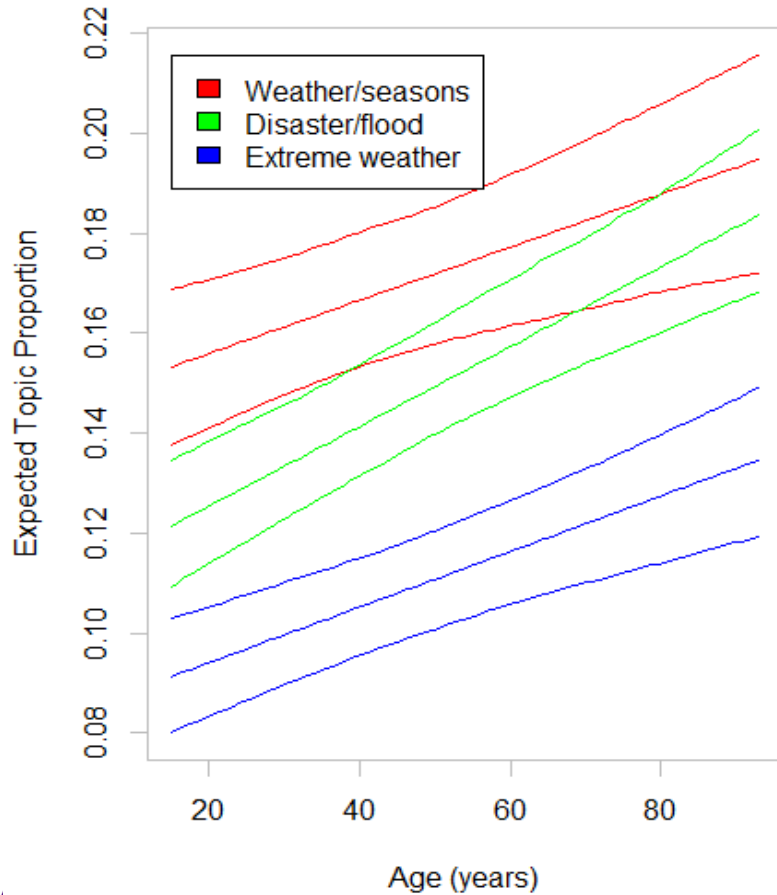
Topic 2: Most representative responses

1. Det blir store naturkatastrofer, ting som vi ikke rår over. Kan skape store katastrofer som rammer oss veldig
2. CATASTROPHES NATURELLES COMME LE RECHAUFFEMENT CLIMATIQUE QUI PROVOQUE DES CATASTROPHES/CT
3. das rhoden der bäume im regenwald und die vielen naturkatastrophen die sogar bei uns eintreffen
4. Flom og at det er oversvømmelser og sånt.
5. L ECOLOGIE / AUTOMATIQUEMENT TOUT CE QUI LIE AU CLIMAT LES CATASTROPHES NATURELLES C EST UN CERCLE JE NE SAIS PAS SI TOUT EST LIE /IL Y A AUSSI LA CAUSE DE L HOMME ON A TROP CONSTRUIT L HOMME A UNE PART DE RESPONSABILITE LA NATURE REPREND TOUJOURS SES DROITS /CT
6. naturkatastrofer|flom jordskjelv
7. CATATROPHES NATURELLES ? GLISSEMEDATION / CYCLONESIN INONFZT DE TERR
8. natur, ubalanse i naturen
9. CATASTROPE NATURELLE INONDATION
10. Hauptverursacher der globalen Erwärmung ist Kohlendioxid, das sind auch Kohle, Oel und Gas, der Klimawandel wird hauptsächlich durch den Menschn verursacht, er ist auch eine große Gefahr für den Menschen.

Correlation with “worry”

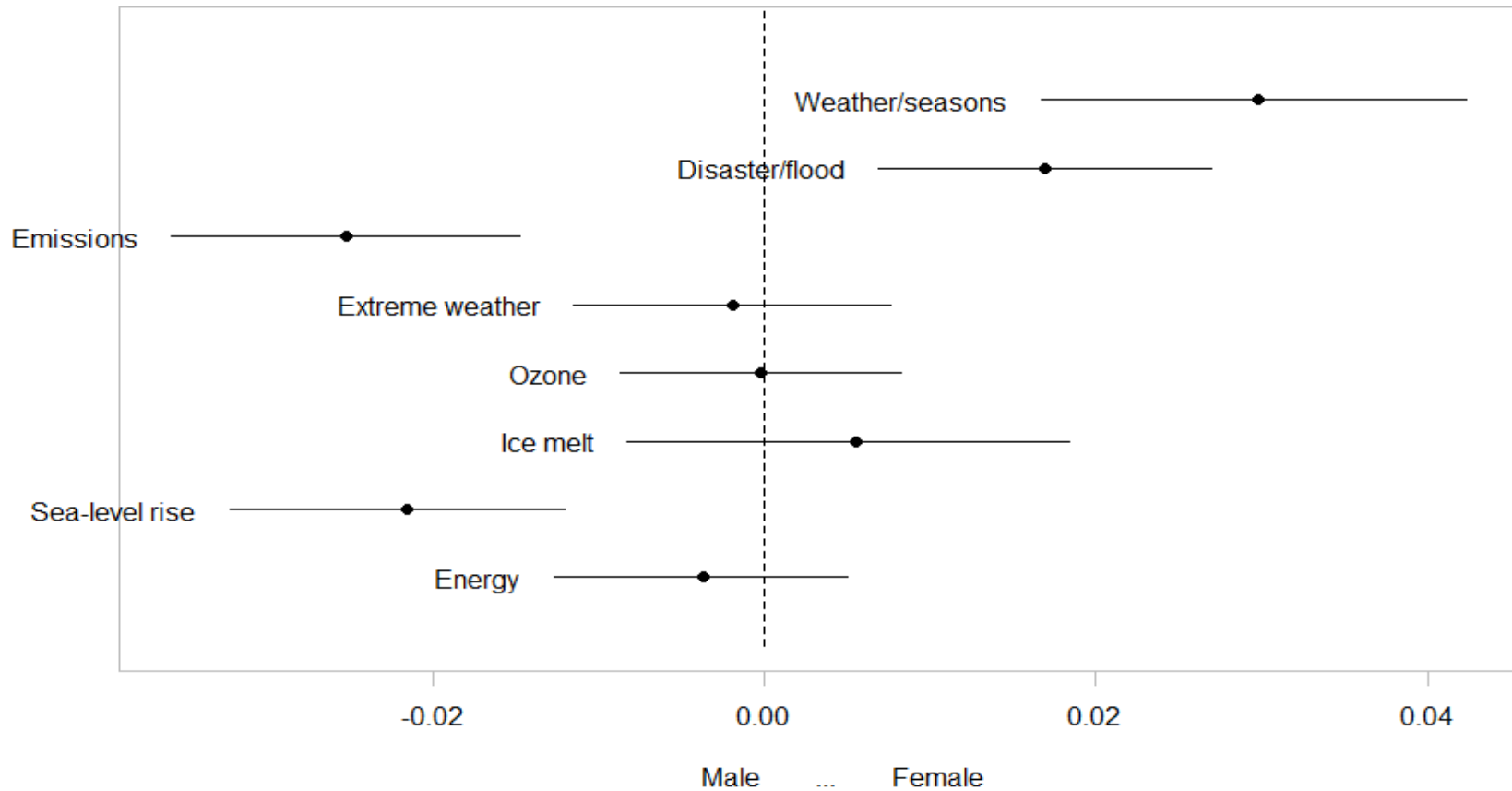


Age

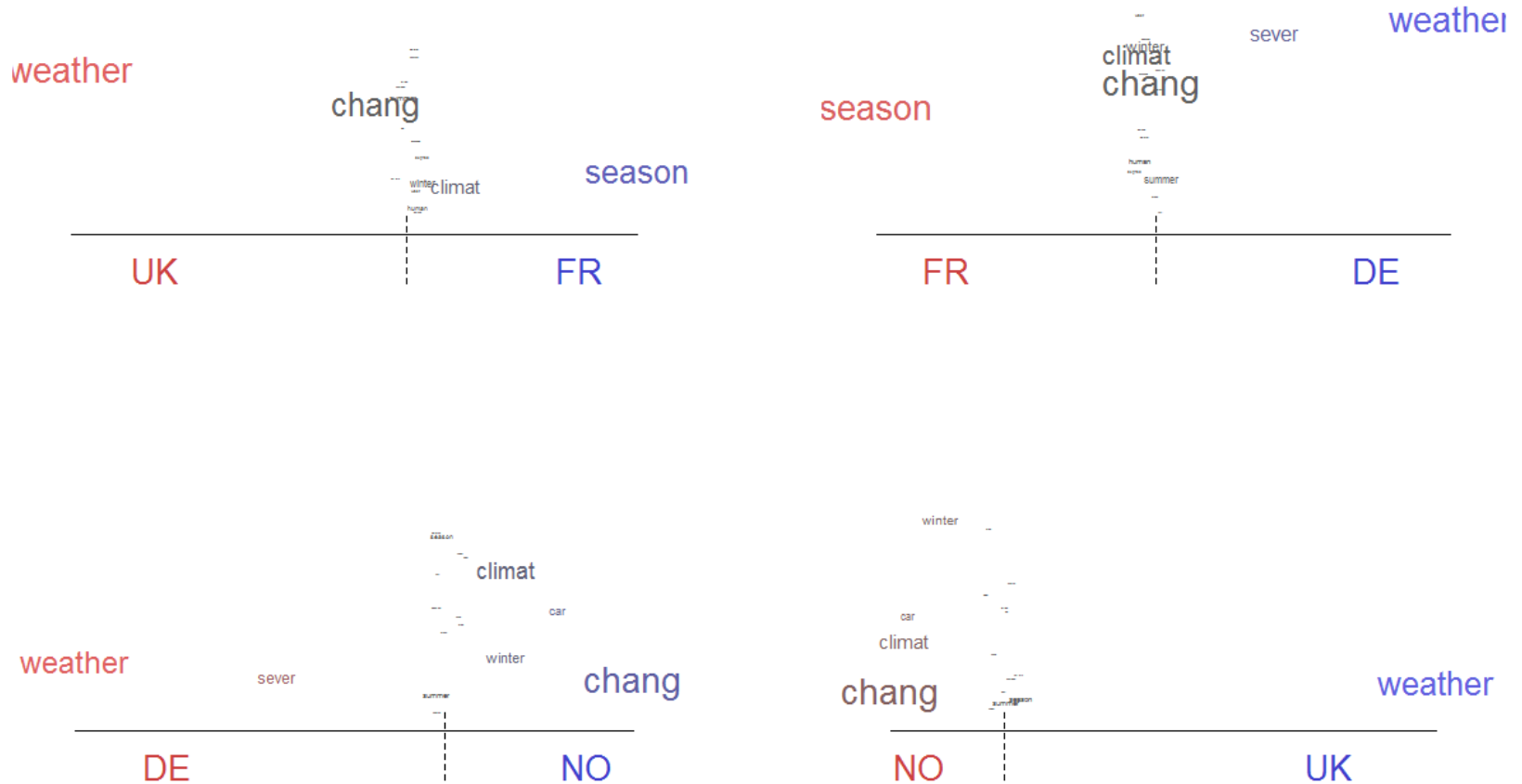


Gender

Gender



Word choice within “Weather/season”



- *How favourable or unfavourable are your overall opinions or impressions of the following energy sources for [COUNTRY]?
→ Coal, wind, solar, nuclear etc.*
- *In politics people sometimes talk of “left” and “right”. Using this card, where would you place yourself on this scale, where 0 means the left and 10 means the right?*

	Weather/se asons	Disaster/ flood	Emissions	Extreme weather	Ozone	Ice melt	Sea-level rise	Energy
Intercept	0.101***	0.061***	0.198***	0.093***	0.112***	0.156***	0.148***	0.131***
	(0.011)	(0.009)	(0.010)	(0.007)	(0.007)	(0.015)	(0.011)	(0.007)
Opinion: coal	0.006 ***	-0.002 [*]	-0.001	0.002	0.003**	-0.000	-0.006***	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Opinion on solar	-0.004 [*]	-0.000	0.002	-0.001	-0.003**	0.002	0.003	0.001
	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)
Left (0) - right (10)	0.000	-0.001 [*]	-0.001	-0.000	0.001	0.002	-0.001	-0.000
	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)
Age (years)	0.001***	0.001***	-0.001***	0.001***	0.000***	-0.001***	-0.000	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Gender (M=1, F=2)	0.029***	0.025***	-0.025***	-0.003	-0.004 [*]	0.002	-0.021***	-0.004 [*]
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)	(0.003)	(0.002)
France	-0.010 [*]	0.022***	0.016***	-0.008**	-0.011***	-0.012 [*]	-0.003	0.007**
	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.005)	(0.004)	(0.003)
Germany	0.004	0.009**	0.006	-0.001	-0.013***	-0.011 [*]	0.007	-0.001
	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.005)	(0.004)	(0.003)
Norway	-0.010 [*]	-0.000	0.015***	0.011***	-0.006 [*]	-0.013 [*]	0.001	0.003
	(0.004)	(0.003)	(0.004)	(0.003)	(0.003)	(0.005)	(0.004)	(0.003)
R ²	0.071	0.129	0.096	0.061	0.045	0.039	0.029	0.033
Adj. R ²	0.069	0.127	0.093	0.059	0.042	0.037	0.026	0.031
Num. obs.	3082	3082	3082	3082	3082	3082	3082	3082
RMSE	0.078	0.059	0.066	0.051	0.050	0.102	0.076	0.050

***p < 0.001, **p < 0.01, *p < 0.05

Statistical models

Summary and next steps

- Similarities greater than differences
- Topic choice predictable from demographics
- Less predictable from attitudes

Next steps:

- Further qualitative analysis on selected topics
- Additional countries/topics: Drought, fire?
- Individual country STM?
- Anything else?

Thank you
endre.tvinnereim@uni.no