Intersectional climate communication: Social identity mechanisms in communicating climate migration

Supplementary materials

1. Methods

1.1. Data collection

Data collection for round 1 took place between 22/03/2023 and 29/03/2023. Collection for round 2 took place between 05/04/2023 and 11/04/2023. Accordingly the delay between the round ranged from 7 to 20 days.

1.2. Survey

Item	M^{T1}	SD^{T1}	M^{T2}	SD^{T2}	Relevant variable
"Climate change is a serious threat to animals and plants"*	6.00	*1.32*	6.06	*1.19*	Beliefs
"Climate change is a serious threat to humans"*	5.87	*1.35*	5.78	*1.30*	Beliefs
"The severity of climate change is often exaggerated" *	3.09	*1.71*	3.22	*1.75*	Beliefs
"We cannot be certain that climate change is caused by humans"*	2.99	*1.74*	2.96	*1.78*	Beliefs
"Climate scientists are reliable sources of science and do an important job"*	5.72	*1.24*	5.62	*1.32*	Trust
"Activists and organizations working with climate change are generally capable, reliable, and have good intentions" *	4.66	*1.54*	4.47	*1.61*	Trust
"Politicians working with climate change are generally capable, reliable, and have good intentions" *	4.04	*1.43*	3.90	*1.45*	Trust
"I worry a lot about the consequences of climate change"*	5.01	*1.59*	4.93	*1.57*	Identification
"My social circles are very invested in climate change"*	4.24	*1.43*	4.07	*1.40*	Identification
"It is important for me to do my best to live in a climate friendly way, and that others do the same"*	4.99	*1.46*	4.91	*1.44*	Identification
"Climate change is an important topic for me personally"*	4.72	*1.66*	4.56	*1.66*	Identification
"It is important that Danish politics make a great effort to stop climate change"*	5.45	*1.53*	5.29	*1.61*	Policy /action
"I am willing to participate in public events for the climate, for example in a climate march"*	2.88	*1.76*	2.72	*1.79*	Policy /action
"When I vote it is important to me that the party or candidate has a clear and ambitious climate agenda"*	4.71	*1.75*	4.67	*1.76*	Policy /action
"I am willing to make changes to my personal lifestyle in order to reduce my CO2 footprint (such as by flying less, reducing meat consumption, change to energy-saving appliances, etc.)"*	5.01	*1.70*	4.91	*1.75*	Policy /action
"Climate change is a polarized topic in the Danish population"*	4.64	*1.14*	4.64	*1.21*	Consensus

" In Denmark there is a general agreement among citizens and politicians on what we need to do to mitigate and prepare for climate change"*	3.90	*1.51*	3.75	*1.45*	Consensus
"While reading the text, did you feel…"†					Affective response
[distressed]			2.59	*1.09*	
[determined]			2.33	*1.05*	
[inspired]			2.26	*1.07*	
[angry]			2.38	*1.22*	
[optimistic]			1.69	*0.90*	
[afraid]			2.17	*1.06*	
[irritated]			2.35	*1.18*	
[alert]			3.04	*1.02*	
"Did the text suggest that these events will take place in the distant future or that they are already occurring?" (slider where 1 = now, 11 = in the distant future)			3.77	*1.93*	Temporal distance
"To which extent did the text refer to events happening close to Denmark versus areas far away from Denmark?" (slider where 1 = Denmark, 11 = areas far from Denmark)			6.18	*2.28*	Geographical distance
"To what extent did you think that the messenger of the text…"*					Inferences about the messenger
[Seemed like a quality source for climate information]			5.30	*1.43*	
[Had a hidden agenda when choosing this focus on climate change]			3.35	*1.77*	
"In your experience, to what extent was the purpose of the text to…"*					Inferences about the messenger
[inform]			5.66	*1.33*	
[spread a political message]			4.30	*1.73*	
"In politics, people often speak of left and right. Where would you place the messenger of the text?" (1 = left, 11 = right)			4.41	*2.36*	Messenger political orientation
"It seems irrelevant to mix migration and refugees into the climate debate"*			3.71	*1.83*	Migration relevance
"It is important that Danish climate politics entail planning for climate migration"*			4.84	*1.38*	Migration relevance

"There are simple things I can do in order to reduce the negative consequences of climate change"*	5.17	*1.44*	Self efficacy
"Through collaboration, people can prevent the negative consequences of climate change"*	5.54	*1.26*	Collective efficacy

* Likert scale 1 = Completely disagree, 7 = Completely agree
† Likert scale 1 = Not at all or very little, 5 = extremely

1.3. Message frames

English translations of the original (Danish) message frames.

1.3.1. Migration frame (Intersectional Message)

367 words

Climate change is driving human displacement
There has long been scientific consensus that the planet is warming due to human emissions of greenhouse gasses. In response, many countries have committed to limiting global temperature increases to 1.5°C to avoid the worst consequences. Despite these commitments, temperatures continue to rise, and we are now witnessing some of the consequences of climate change on society.

Climate change particularly contributes to humanitarian crises. In various parts of the world, rising temperatures and extreme weather have affected the habitability of local areas in multiple ways, increasingly forcing people to leave their homes. Storms, heatwaves, and droughts are becoming more severe and frequent. Weather conditions like these can lead to acute natural disasters such as floods and wildfires, temporarily displacing local populations until their homes again become habitable and safe.

Long-term climate changes can also impact agriculture, access clean drinking water, and make infectious diseases more prevalent. Such instability in food, water, and public health can cause lasting harm to the viability of vulnerable areas and may compel people to migrate more permanently to places less affected by climate change.

Together, these impacts of climate change have already led to millions of people being displaced from their homes annually. Climate change particularly threatens people in vulnerable and resource-poor regions of the world, and these are concentrated in the Global South. People in these regions will increasingly be forced

to migrate temporarily or permanently to avoid the negative effects of climate change, which are already being experienced in these areas.

Currently, the majority of climate migration occurs within national borders, such as when residents of low-lying coastal areas move further inland to escape rising sea levels. As temperatures continue to rise and the consequences worsen, it is to be expected that climate migrants will also seek more stable and secure areas in the Global North, such as European countries.

Migration is expected to become an increasingly large consequence as climate change progresses. If the countries of the world succeed in limiting global temperature increases to 1.5 degrees, it will, on the other hand, make it less likely that large numbers of people will be forced to leave their homes and homelands.

1.3.2. Nature frame (Traditional Message)

374 words

Climate change threatens plants and wildlife
There has long been scientific consensus that the planet is warming due to human emissions of greenhouse gasses. In response, many countries have committed to limiting global temperature increases to 1.5°C to avoid the worst consequences. Despite these commitments, temperatures continue to rise, and we are now witnessing some of the consequences of climate change for nature.

Climate change particularly contributes to natural disasters and biodiversity crises. In various parts of the world, rising temperatures and extreme weather have affected ecosystems and habitats, posing an increasing threat to animal and plant species. For example, storms, heatwaves, and droughts are becoming more severe and frequent.

Weather conditions like these can lead to acute natural disasters such as floods and wildfires.This poses an immediate danger to local wildlife and often causes temporary damage to habitats. As these weather events become more frequent, it becomes increasingly difficult for populations of endangered animals and plants to recover. Long-term changes in climate can also impact the well-being and resilience of animals and plants in their native environments.

For instance, prolonged droughts can hinder terrestrial animals' ability to find food and water to drink. Seasonal shifts, temperature changes, and altered water levels have contributed to about half of the Earth's species moving toward the poles or higher altitudes. This also means that invasive species are encroaching into new ecosystems and can harm or outcompete rare native species.

Collectively, these effects of climate change have already led to significant losses of biodiversity around the world. Climate change especially threatens biodiversity in regions closer to the equator, where delicate ecosystems support a rich diversity of animal and plant life. Some of these losses are already irreversible, such as loss of species. As temperatures continue to rise and the consequences worsen, increasing changes and losses in biodiversity in the Global North, for example, in European countries, are to be expected.

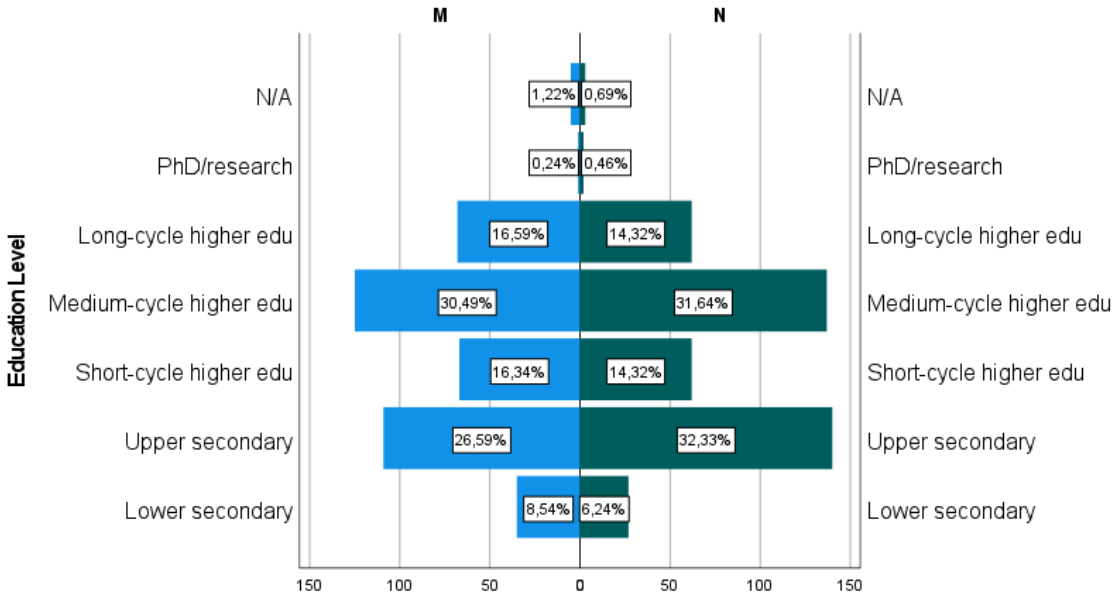
The biodiversity crisis is expected to become an increasingly large consequence as climate change progresses. If the countries of the world succeed in limiting global temperature increases to 1.5 degrees, it will, on the other hand, make it less likely that large numbers of animal and plant species will be threatened or go extinct.

1.4. Demographics distribution

		N		M	
		Count	%	Count	%
Gender	Female	209	48%	208	51%
	Male	223	52%	201	49%
	Other/NA	1	0%	1	0%
Nationality	Danish	423	98%	406	99%
	Other	6	1%	3	1%
	NA	4	1%	1	0%
Ethnicity	Danish	403	93%	386	94%
	Other	20	5%	18	4%
	NA	10	2%	6	1%

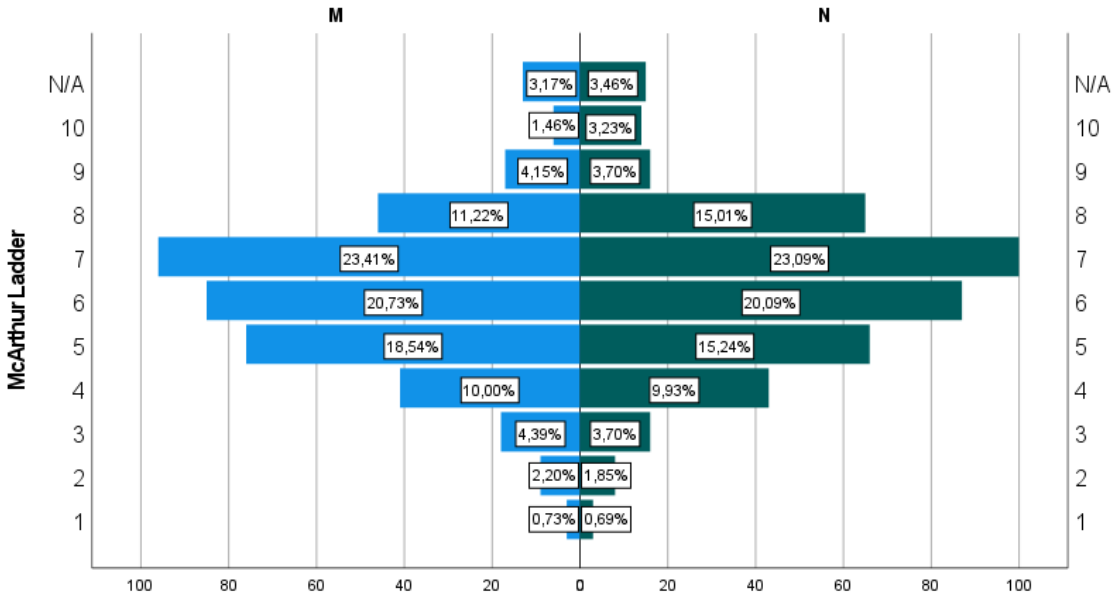
	N		M	
	Mean	SD	Mean	SD
Political orientation (1 = left, 11 = right)	5,87	3,03	5,72	2,91
Age	50,79	17,88	50,96	17,25

Education

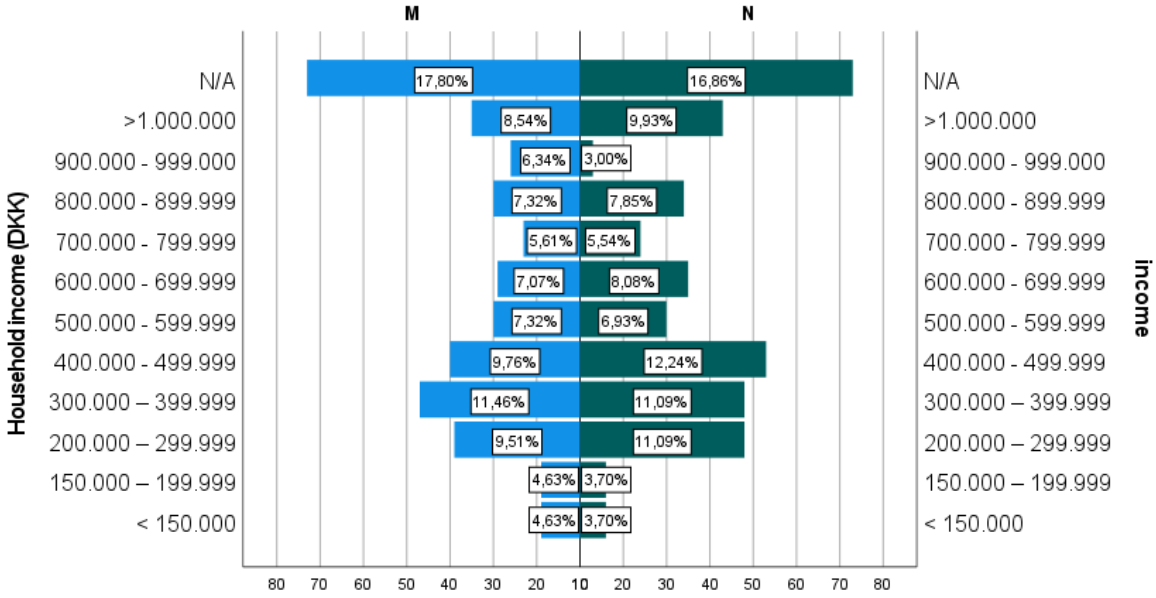


McArthur Ladder

Subjective socio-economic status where 1 corresponds to the least affluent and 10 is the most affluent



Income



2. Supplementary analyses

2.1. Outgroup index

The outgroup index also significantly predicted the amount of attitude change (T2-T1). Perceiving the messenger as politically further from the individual's own stance was associated with more negative attitude change (β = -.088, t(665) = -2.28, p = .023). When including political orientation in the model, this effect became non-significant (β = -.06, t(664) = -1.25, p = .212), likely reflecting the tendency to perceive the messenger as left-oriented across the political spectrum, and that right-orientation is associated with negative attitude change.

2.2. Message and comprehension checks

2.2.1. Text focus

	Text focus						
	Human displacement	Human harm	Nature harm	Societal transition	Private behavior change	Climate migration to Denmark	other (text box)
Nature	1,8%	2,1%	85,7%	6,9%	3,0%	0,5%	0,0%
Migration	79,0%	5,9%	3,9%	3,7%	2,9%	4,4%	0,2%

The far majority of respondents in both groups reported the appropriate focus of the text. In the nature condition 85,7% responded the the focus of the text was “how climate change can

harm nature and wildlife", while the second most frequent response in this group was "how we need to transition society in order to mitigate climate change" (6,9%). Since this was not the focus of the text, we assume that this group may not have read the text with sufficient attention. In the migration condition 79% responded "how climate change can displace people from their homes", where the second most common response was the more generic answer "how climate change can harm humans", which also was accurate for their condition.

2.2.2. Perceived geographical and temporal distance

We asked participants to rate how far away in time and geographically the events referred to in the text are taking place on a scale from 1 (now/Denmark) to 11 (in the far future/areas far away from Denmark). T-tests showed that respondents in the migration group perceived the content of the text as marginally more distant temporally (M = 3.90, SD = 1.92, p = .064) and significantly more distant geographically (M = 6.75, SD = 2.17, p < .001) distant than did the nature group (temporal distance: M = 3.65, SD =1.93; geographical distance: M = 5.64, SD = 2.26).

2.3. Perceived relevance

To assess the effect of the migration condition, two items targeted how relevant respondents perceived migration to be within the climate change debate ("It seems irrelevant to mix migration and refugees into the climate debate" - reversed; "It is important that Danish climate politics involve making plans regarding climate migration"). These items were introduced only at T2 in order to avoid priming. The items were not strongly correlated (r = .35, p = ??), and are therefore treated separately. A simple moderation PROCESS model (number 1; Hayes, 2022) showed that the perceived importance of planning for climate migration in Danish climate politics was positively associated with the migration condition (b = .213, p = .033, 95% CI [.017, .408]) and negatively with right-orientation (b = -.083, p < .001, 95% CI [-.129, -.038]). Political orientation did not moderate the effect of condition (b = -.0165, p= .624, 95% CI [-.083, .050]). The migration condition significantly predicted perceived relevance of migration in the climate debate (b = .891, *p* < .001, 95% CI [1.148, .634]). This relationship was moderated by political orientation (b = -.102, *p* = .02, 95% CI [-.015, -.189]), while political orientation itself was no predictor (b = .015, *p* = .612, 95% CI [.075, .044]). In other words, the migration condition was associated with substantially more

perceived relevance in people who identify more with the political left than right. Tentatively, this suggests that intersectional messages like this can be effective across the political spectrum in emphasizing the relevance of migration in the climate debate, although it might be particularly effective in left-oriented citizens.

3. Pilot study

We ran a pilot study using Danish speaking respondents via prolific (N = 117) to test the plausibility of interactive effects of political orientation and message frames on the dependent variables. The pilot design was cross-sectional and exposed respondents to early versions of the two texts, after which we measured the same DVs as in the main study. This revealed an interactive pattern whereby intersectional communication (Migration frame) created resistance only among those on the political right. These results informed the information size, and in conjunction with comments to an open-ended question, we adjusted the messages to maximize similarity, and omitted an item with minimal contribution.

PROCESS model 1, effect of condition on climate attitude score moderated by political orientation

	coeff	se	t	p	LLCI	ULCI
constant	5,2776	,0825	63,959	,0000	5,1140	5,4413
Condition (M = 1)	-,171	,173	-,989	,325	-,513	,172
Political orientation (1 = left, 11 = right)	-,257	,034	-7,495	,000	-,325	-,189
Condition x Political orientation	-,217	,069	-3,161	,002	-,352	-,081

Effect of condition on climate attitudes conditional on level of political orientation

	Effect	se	t	p	LLCI	ULCI
-1 SD	,359	,246	1,460	,148	-,129	,846
Mean	,171	,173	-,989	,325	-,513	,172
+1 SD	-,700	,235	-2,977	,004	-1,167	-,234