Online Appendix for

**Cognitive Biases and Communication Strength in Social Networks:
The Case of Episodic Frames**

A1 Measurement Details for Test 1

A1.1 Supplemental description and discussion of the episodic and thematic frames

Figure A1 below shows the full wording of the four news articles to which the respondents were randomly assigned in Survey 1 in Test 1. As explained in the main text, each news article included an episodic and a thematic frame. All of the experimental stimuli were carefully written in collaboration with a professional journalist working on the basis of the authors' instructions to ensure ecological validity and mundane realism while maintaining experimental control.

In terms of the content of the frames, as outlined by Robert Entman,[1] a frame 1) defines the problem, 2) diagnoses causes, 3) makes moral judgments, and 4) suggests remedies. The episodic and thematic pro frames and con frames were matched to each to include each of these four elements: The underlying problem definition of the episodic and thematic financial motivation pro frames was that social welfare recipients lack the financial motivation to find gainful employment. The underlying diagnosis of the causes in these pro frames was that generous social benefits undermine the motivation of social welfare recipients to find paid employment and that reducing benefits might solve the problem. The underlying moral judgment of the episodic and thematic pro frames was that it was correct to reduce social welfare benefits, which was also the implied remedy.

In contrast, the underlying problem definition of the episodic and thematic financial destitution con frames was that social welfare recipients are socially and financially destitute. The underlying diagnosis of causes was that reducing social welfare benefits affects the wrong people (i.e. sick people rather than lazy people), thereby making life unjustly worse for society's weakest members. The underlying moral judgment of these con frames was that it was wrong to reduce social welfare benefits, the implied remedy being not to reduce social welfare benefits. The consistency of

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[1] Entman 1993, p. 52.

the issue frame of the episodic and thematic pro and con frames was further increased by using the same headline for the respective frames (see Figure A1 below).

The four frames were matched on structure, including length (100–103 words each in the original Danish versions, see Figure A1.2), headline size, and the use of quotes. Furthermore, a separate pretest validated that the frames had the same cohesive quality (see details in Online Appendix A1.2 below). The pretest results support the comparability of the four frames and ensure that any differences in the recollection, transmission, and persuasive effects of episodic and thematic frames are caused by the variation in the type of information reported in the frames and not by simple differences in cohesive quality.

To control for the order of the episodic and thematic frames in the news articles, we varied experimentally whether the episodic or thematic frame appeared first. Finally, consistent with prior operationalizations of political frames,[2] all of the versions of the news article feature two sections with the same neutral information about the general topic of the article. Specifically, this information described the proposal and mentioned that there was debate about it. In the news articles, the first sentence mentioning the debate about the proposal was presented before the first type of framed information was introduced (episodic or thematic). The section with the neutral information describing the proposal then appeared before the second type of framed information (episodic or thematic). Thus, a neutral item of information describing the core topic always appeared before the framed information. In Figure A1, the framed information is italicized (the italics were not shown to the respondents). The section with the neutral information is not italicized.

The news articles in Figure A1 have been translated into English from the original Danish articles. The framed information is italicized. The italics were not shown to the respondents. The original Danish news articles are reported in Figure A2.

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[2] E.g. Druckman 2001; Druckman, Peterson, and Slothuus 2013.

In constructing our experimental stimuli in the form of the news articles, we made a number of methodological choices worth noting. Most importantly, as described in the main text, our research design involved the comparison of episodic and thematic frames embedded in 'pro' and 'con' frames, respectively. This allowed us to investigate the transmission of episodic and thematic frames when they appeared in competition while holding the direction of the frame constant; hence, increasing the internal validity of the test in this crucial respect. We do acknowledge, however, that this choice occurred at the expense of ecological validity. In real-world political communication, many media frames are presented as 'dual frames', involving the simultaneous presentation of the 'pro' and the 'con' sides frames.[3] Future research should investigate the transmission of episodic and thematic frames when they are included in such dual frames to further increase ecological validity and explore the generalizability of the theoretical argument.

Furthermore, we prioritized the strength of the experimental manipulation slightly at the expense of internal validity. Specifically, as described in the main text and above, the 'con' frame focused on a young man, whereas the 'pro' frame focused on a single mother. Past research has suggested that for our particular population, young men are seen as particularly undeserving of welfare benefits,[4] whereas single mothers are seen as highly deserving.[5] This maximized the strength of the manipulation with these specific episodes but at the same time introduced the difference in the gender of the specific individual in the episodic pro and con frames. We know of no specific reasons why this would bias the results, but further research involving similar frames could consider removing such differences. Importantly, the analysis of robustness supports the robustness of the empirical findings in the current manuscript across the 'pro' and 'con' conditions (see Online Appendix A2.3, A3.4–5).

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[3] Chong and Druckman 2007, p. 638.
[4] Petersen et al. 2012.
[5] Sniderman et al. 2014.

A1.1.1 Wording of the original news articles with the episodic and thematic frames

Figure A1 below reports the wording of the four experimental conditions: the episodic and thematic 'pro' financial motivation frames and the episodic and thematic 'con' social destitution frames. The news articles in Figure A1 have been translated into English from the original Danish versions. The original Danish frames are found in Figure A2.

Fig. A1 Wording of the original news articles in Survey 1 (English translation)

	Issue frame	
	Pro financial motivation frame	**Con destitution frame**
	Lower cash benefits push recipients into employment By Søren Frederiksen	**Lower cash benefits increase poverty** By Søren Frederiksen
Episodic frame	Parliament is currently discussing a proposal to reduce cash benefits. *If that happens, it will no longer make financial sense for cash benefit recipients like 31-year-old Jesper Jørgensen to play computer games instead of working. Jesper Jørgensen has been living off of cash benefits for 11 years and spends most of the day playing war games over the Internet. He does not want to give up his way of life because he risks losing money by working. 'So frankly speaking, I don't see why I should. But if the benefits were lower and it made sense to work, I would probably find a job', Jesper Jørgensen explains.*	Parliament is currently discussing a proposal to reduce cash benefits. *If that happens, it will become harder for cash benefit recipients like 35-year-old Rikke Hansen to afford basic necessities at the end of the month. Rikke Hansen is a single mother of three small children and has been living off of cash benefits for 11 years. She wants to work, but it is difficult for her to find a job due to a back injury and problems with anxiety. Every month is a struggle to make ends meet. 'If the cash benefits are lowered, I'll only be able to think one meal ahead for my children and myself', Rikke Hansen explains.*
Thematic frame	The new proposal aims to lower benefits to a level where the 'profit' from taking a low-paid, unskilled job will always be at least DKK 2,000. *Today, many long-term cash benefit recipients stand to gain little financially from working. According to recent estimates, 85,000 cash benefit recipients would earn less than DKK 1,000/month extra by quitting life on welfare. For some, it would require an annual income of DKK 355,200 for full-time work to pay off. According to a study by KPMG Consultancy, this may explain why many cash benefit recipients prefer to stay home and spend time on their hobbies. 'A 10 per cent cut in benefits would send approx. 25 per cent of cash benefit recipients into employment', explains consultant Torben Petersen.*	The new proposal aims to lower benefits to a level where the 'profit' from taking a low-paid, unskilled job will always be at least DKK 2,000. *Today, a large number of long-term recipients are living on an amount of money that does not cover even the most modest costs of living. According to a new study, 26 per cent of recipients are outright poor, and many in this group are providing for children. A KPMG Consultancy report documents that 80 per cent of the most challenged cash benefit recipients struggle with massive physical and mental health problems, and a cut in benefits would not bring them closer to the labour market. This is because financial incentives have no effect on disadvantaged people. 'A 10 per cent cut in benefits would push approx. 25 per cent more benefit recipients into poverty', explains consultant Peter Andersen.*

Note. The news articles have been translated from Danish into English.

Fig. A2 Wording of the original news articles in Survey 1 (in Danish)

	Issue frame	
	Pro financial motivation frame	**Con destitution frame**
	Lavere ydelser får kontanthjælpsmodtagere i job Af Søren Frederiksen	**Lavere kontanthjælp skaber øget fattigdom** Af Søren Frederiksen
Episodic frame	Politikerne på Christiansborg diskuterer i øjeblikket et forslag om at sænke kontanthjælpen. *Hvis det sker, vil det ikke længere kunne betale sig for kontanthjælpsmodtagere som den 31-årige Jesper Jørgensen at spille computer frem for at gå på arbejde. Jesper Jørgensen, der har været på kontanthjælp i 11 år, bruger i dag det meste af døgnet på at spille krigsspil over internettet. Han vil ikke opgive tilværelsen på kontanthjælp, fordi han risikerer at sætte penge til ved at gå på arbejde. "Så jeg kan ærlig talt ikke se, hvorfor jeg skulle gøre det. Men jeg ville nok finde et job, hvis kontanthjælpen var lavere, så det kunne betale sig at arbejde," siger Jesper Jørgensen. (101)*	Politikerne på Christiansborg diskuterer i øjeblikket et forslag om at sænke kontanthjælpen. *Hvis det sker, vil det blive sværere for kontanthjælpsmodtagere som den 35-årige Rikke Hansen at få råd til basale dagligvarer sidst på måneden. Rikke Hansen er enlig mor til tre små børn og har været på kontanthjælp i 11 år. Hun vil gerne have et arbejde, men har svært ved at få det på grund af en rygskade og problemer med angst, så for Rikke Hansen er hver måned en kamp for at få pengene til at slå til. "Hvis kontanthjælpen sænkes, vil jeg kun have overskud til at tænke på det næste måltid til mig selv og mine børn," siger Rikke Hansen. (103)*
Thematic frame	Det nye forslag går ud på at sænke ydelserne, så gevinsten ved at tage et lavtlønnet ufaglært job altid vil være minimum 2.000 kr. om måneden. *I dag er der mange langtidsledige kontanthjælpsmodtagere, som kun vil få et beskedent økonomisk udbytte af at arbejde. Ifølge nye tal vil 85.000 kontanthjælpsmodtagere kunne tjene mindre end 1.000 kr. ekstra om måneden ved at kvitte kontanthjælpen, og i nogle tilfælde forudsætter det en årlig indtægt på helt op til 355.200 kr., hvis fuldtidsarbejde skal kunne betale sig. Måske er det årsagen til, at mange kontanthjælpsmodtagere, ifølge en undersøgelse fra konsulenthuset KPMG, foretrækker at blive hjemme og tilbringe tiden med fritidsinteresser. "Hvis ydelserne sættes 10 pct. ned, vil ca. 25 pct. af kontanthjælpsmodtagerne komme i beskæftigelse," forklarer konsulent Torben Petersen. (100)*	Det nye forslag går ud på at sænke ydelserne, så gevinsten ved at tage et lavtlønnet ufaglært job altid vil være minimum 2.000 kr. om måneden. *I dag lever et stort antal langtidsledige kontanthjælpsmodtagere for beløb, der ikke rækker til at dække selv beskedne leveomkostninger. En ny undersøgelse viser, at 26 pct. af kontanthjælpsmodtagerne er decideret fattige, og at mange i denne gruppe har børn at forsørge. Samtidig dokumenterer en rapport fra konsulenthuset KPMG, at 80 pct. af de svageste kontanthjælpsmodtagere har massive fysiske og psykiske helbredsproblemer og ikke vil komme tættere på arbejdsmarkedet, hvis kontanthjælpen sættes ned. Det skyldes, at økonomiske incitamenter ikke virker på ressourcesvage mennesker. "Hvis ydelserne sænkes med 10 pct., vil ca. 25 pct. flere kontanthjælpsmodtagere leve i fattigdom," forklarer konsulent Peter Andersen. (101)*

Note. The numbers in parentheses in the end of each framed section in Fig. A2 refers to the total number of words in each framed section. The framed information is italicized (the italics were not shown to the respondents).

A1.2 Pretest of the cohesive quality of the original episodic and thematic frames

To ensure that the cohesive quality of the episodic and thematic frames did not differ, we conducted a separate pretest. The pretest was fielded by the Epinion survey agency to a nationally representative sample drawn from the agency's standing online panel. Using quota sampling, the sample was drawn to match the population on the parameters gender, age, and education. The survey was collected as an online web survey in the week of September 18–23, 2012 (n = 105).

In the pretest, the participants were instructed to read and evaluate four short newspaper texts. They were instructed that the newspaper texts and the political proposal they described were fictitious but could very likely have appeared in a larger Danish newspaper. The respondents were instructed that all newspaper texts focused on the same political proposal to reduce social welfare benefits. They were told that they might agree or disagree with some of the arguments they would encounter in the newspaper texts. They were asked to disregard their own opinion on the proposal itself and the arguments, focusing only on evaluating how coherent, fluent, and easy-to-read the newspaper texts were written.

Each respondent evaluated four newspaper texts. A total of 50 respondents evaluated the text in the four articles used in the main study. The respondents in the pretest read the text of the four news articles as presented in Figure A1 except that the headlines and the name of the journalist were not presented, as each respondent evaluated four texts.

To assess the cohesive quality of each article, the respondents in the pretest answered the following questions after reading each text: 'How much do you disagree or agree with the following statements?' 1. 'The text was written in coherent language', 2. 'The text was written in fluent language', 3. 'The text was easy to read', 4. 'The text had a coherent structure', 5. 'The text was relevant to the proposal'. Answers were measured on a 7-point scale with endpoints labelled 'Completely disagree' and 'Completely agree'. Answers were summed to a highly reliable scale

ranging from 0–1 and measuring the cohesive quality of each frame ($\alpha_{\text{Episodic financial pro frame}}$ = 0.89,

($\alpha_{\text{Thematic financial pro frame}}$ = 0.91, $\alpha_{\text{Episodic destitution con frame}}$ = 0.91, ($\alpha_{\text{Thematic destitution con frame}}$ = .95).

Table A1, Panel A, shows the mean cohesive quality of the episodic and thematic frames selected for the main study, while Panel B reports paired samples t-test of mean differences between the four frames. Cohesive quality ranges from 0–1, higher values indicating higher quality. The results in Table A1, Panels A–B, support that the episodic and thematic frames had highly similar cohesive quality, and the statistical significance testing of mean differences shows that none of the four frames was perceived as having a significantly higher quality than the others (all *p*-values of mean differences = 0.236 or higher). These findings support that any differences in the recollection, transmission, and persuasive effects of episodic and thematic frames are caused by the variation in the type of information reported in the frames as opposed to simple differences in cohesive quality.

TABLE A1 Cohesive Quality of the Episodic and Thematic Frames

Panel A. Mean cohesive quality by frame				Panel B. Paired samples t-tests of mean differences				
	Mean cohesive quality	n			Episodic financial pro frame	Thematic financial pro frame	Episodic destitution con frame	Thematic financial pro frame
Episodic financial pro frame	.67 (.19)	50		Episodic financial pro frame	-			
Thematic financial pro frame	.68 (.18)	50		Thematic financial pro frame	-0.01, p = .758,	-		
Episodic destitution con frame	.71 (.19)	50		Episodic destitution con frame	-0.04, p = .249	-0.03, p = .315	-	
Thematic financial pro frame	.67 (.23)	50		Thematic financial pro frame	0.00, p = .985	0.01, p =.801	0.04, p =.236	-

Note. Cohesive quality was measured on a scale ranging from 0–1, higher values indicating higher quality. Entries in Panel A in the column 'Mean cohesive quality' are means with standard errors in parentheses. Entries in Panel B are mean differences with p-values calculated using paired samples t-test.

A1.3 Supplemental discussion of the recollection instructions

As described in the main text, after reading the recollection, the respondents were taken to a new screen and asked to write a recollection for a new participant. Specifically, the respondents were instructed to recollect the news story as clearly as possible and include as many details as possible consistent with past state-of-the-art research in social psychology applying the chain transmission design.[6] This design maximized our ability to study differences in the ability of citizens to transmit episodic and thematic information. To further increase the external and ecological validity and extend applications of the chain transmission design when studying the transmission of political information and communication strength, future research could vary what the instructions tell the respondents to focus on in their recollections (e.g. the essence of the story or the most interesting part) and to whom the respondents are instructed to write the recollection (i.e. a friend, colleague, or fellow partisan) and who the respondents are asked to imagine as the source of the recollections they are presented with (i.e. a friend, colleague, or fellow partisan).

A1.4 Supplemental description of the ideologically stratified randomization

As described in the main text, the random assignment to the news stories (Survey 1) and the recollections of the news stories (Surveys 2–3) were stratified on the respondents' ideological self-placement for the purpose of a different research question. The ideologically stratified random assignment to conditions was implemented in the following manner: In Survey 1, half of the left-wing respondents read a pro financial motivation frame while the other half read a con destitution frame; likewise for ideologically right-wing respondents. In Survey 2, half of the left-wing respondents read a recollection from a left-wing respondent and the other half read a recollection from a right-wing respondent; likewise for ideologically right-wing respondents. Finally, in Survey

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[6] Cf. Mesoudi, Whiten, and Dunbar 2006.

3, half of the left-wing and right-wing respondents each read a recollection, which in the two previous surveys had been recollected by respondents with the same ideological leaning. The other half read a recollection which at least in one previous survey had been recollected by a respondent with a different ideological leaning.

A1.5 Coding dictionaries for the automatic, computer-based content analysis

As described in the main text, we used dictionary-based automatic content analysis[7] to measure how much information the respondents recollected from the original episodic and thematic frames in the news article. Figure A3.1 reports the full coding dictionaries used for the automatic content analysis. The key words in Figure A3.1 have been translated into English from the original Danish key words. The original Danish key words are found in Figure A3.2.

Fig. A3.1 Overview of coding dictionaries for the episodic and thematic pro and con frames. English translation

Thematic pro coding dictionary:	10; 25; 1,000; 85,000; 355,200; working; annual; employment; little; pay; extra; prefer; require; hobbies; full-time work; home; income; consultant; consultancy; KPMG; quitting; month; less; financially; per cent; Petersen; estimates; time; spend; earn; Torben; gain; study; benefits
Episodic pro coding dictionary:	11; 31; frankly (speaking); working; year-old; make financial sense; spends; computer day; find; instead; Internet; Jesper; job; Jørgensen; war games; longer; lower; most; give up; money; risks; losing; play; (frankly) speaking; way of life
Thematic con coding dictionary:	10; 25; 26; 80; Andersen; number; labour market; amount; modest; children; cover; outright; documents; poverty; poor; providing for; physical; health problems; incentives; consultant; consultancy; KPMG; costs of living; massive; people; financial; per cent; Peter; mental; report; disadvantaged; cut; large; most challenged; study; benefits; living; have (no) effect
Episodic con coding dictionary:	11; 35; anxiety; year-old; basic; children; necessities; single; wants; Hansen; every; struggle; meal; month; the month; my; mother; ahead; be able to; make ends meet; problems; afford; Rikke; back injury; lowered; end of; make (ends meet); small; harder; difficult; think

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[7] Cf. Kellstedt 2000; Laver and Garry 2000.

Fig. A3.2 Overview of coding dictionaries for the episodic and thematic pro and con frames. Original Danish key words

Thematic pro coding dictionary:	10; 25; 1.000; 85.000; 355.200; arbejde; årlig; beskæftigelse; beskedent; betale; ekstra; foretrækker; forudsætter; fritidsinteresser; fuldtidsarbejde; hjemme; indtægt; konsulent; konsulenthuset; KPMG; kvitte; måneden; mindre; økonomisk; pct; Petersen; tal; tiden; tilbringe; tjene; Torben; udbytte; undersøgelse; ydelserne
Episodic pro coding dictionary:	11; 31; ærlig; arbejde; årige; betale; bruger; computer; døgnet; finde; frem; internettet; Jesper; job; Jørgensen; krigsspil; længere; lavere; meste; opgive; penge; risikerer; sætte; spille; talt; tilværelsen
Thematic con coding dictionary:	10; 25; 26; 80; Andersen; antal; arbejdsmarkedet; beløb; beskedne; børn; dække; decideret; dokumenterer; fattigdom; fattige; forsørge; fysiske; helbredsproblemer; incitamenter; konsulent; konsulenthuset; KPMG; leveomkostninger; massive; mennesker; økonomiske; pct; Peter; psykiske; rapport; ressourcesvage; sænkes; stort; svageste; undersøgelse; ydelserne; leve; virker
Episodic con coding dictionary:	11; 35; angst; arbejde; årige; basale; børn; dagligvarer; enlig; gerne; Hansen; hver; kamp; måltid; måned; mine; mor; næste; overskud; pengene; problemer; råd; Rikke; rygskade; sænkes; sidst; slå; små; sværere; svært; tænke

A1.6 Validation of the automatic content analysis through human coding

Following Kellstedt's procedure[8] and the recommendations made by Grimmer and Stewart,[9] a human-coded content analysis was performed to validate the procedure for our automatic, computer-assisted content analysis and ensure that there were no systematic problems with the automatic coding. The unique advantage of the automatic, dictionary-based, and computer-assisted content analysis is that it allows us to obtain a transparent, highly reproducible measure that is unaffected by biases and the fatigue of individual human coders.[10] Yet a possible concern is that we potentially miss out on words that are slightly misspelled. Likewise, the automatic, dictionary-based content analysis is insensitive to problems with homonyms, where for example a number is recollected as in the frame but placed in a contextual meaning that is completely different from the original frame.[11]

Specifically, two human coders coded a total of 86 recollections to validate the coding procedure from the automatic, computer-assisted content analysis. The 86 recollections were drawn from Survey 1. The 86 recollections correspond to approximately 13 per cent of the recollections from Survey 1 in Test 2.

In the human-coded content analysis, recollections of the financial pro motivation frame were coded using the episodic and thematic pro dictionaries, while recollections of the destitution con frame were coded on the basis of the episodic and thematic con dictionaries (see Online Appendix A1.4, Figure A3.1 above). Specifically, the human coders coded the recollections in four different ways to validate the use of the dictionaries in the automatic content analysis: 1) First, the human coders coded the total number of words from the dictionaries appearing in each recollection exactly as spelled in the dictionaries. 2) Second, the human coders coded the total number of words from the dictionaries appearing in each recollection but also including words with random spelling and

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[8] Kellstedt 2000.
[9] Grimmer and Stewart 2013.
[10] Alexa 1997; Linderman 2001.
[11] E.g. Linderman 2001.

grammatical mistakes as long as the words were recognizable and unambiguous. Numbers were not included in this second code (the full coding dictionary that was used is reported in Figure A3 'coding dictionaries for point 2 in the human-coded content analysis'. 3) Third, the human coders coded how many times the numbers from the dictionaries appeared in total and checked that the contextual meaning of each recorded number was the same as in the original news article. This ensures that homonyms (i.e. words and numbers with the same spelling but different meanings) were not included in the human coding (the full coding dictionary that was used is reported in Figure A4 'coding dictionaries for point 3 in the human-coded content analysis'). 4) The person coded how many times the numbers from the dictionaries appeared using the same coding rules as described under point 3 except that they also included numbers where just the first cipher was correct as long as the number appeared in the same contextual meaning as in the original news article.

To ensure satisfactory intercoder reliability and their ability to use the codebook, the human coders completed two training sessions on the coding of examples of recollections before initiating the actual human-coded content analysis.

Fig. A4 Coding dictionary for the human-coded content analysis (points 2 and 3)

Coding dictionaries for point 2 in the human-coded content analysis:

Thematic pro coding dictionary:	work; annual; employment; little; pay; extra; prefer; require; hobbies; full-time work; at home; income; consultant; consultancy; KPMG; quitting; month; less; financially; per cent; Petersen; estimates; time; spend; earn; Torben; profit; study; benefits
Episodic pro coding dictionary:	frankly; work; year-old; make financial sense; spends; computer day; find; instead; Internet; Jesper; job; Jørgensen; war game; longer; lower; most; give up; money; risks; losing; play; (frankly) speaking; way of life
Thematic con coding dictionary:	Andersen; number; labour market; amount; modest; children; cover; outright; documents; poverty; poor; providing for; physical; health problems; incentives; consultant; consultancy; KPMG; costs of living; massive; people; financial; per cent; Peter; mental; report; disadvantaged; cut; large; most challenged; study; benefits; living; have (no) effect
Episodic con coding dictionary:	anxiety; year-old; basic; children; necessities; single; want; Hansen; every; struggle; meal; month; the month; my; mother; ahead; be able to; make the ends meet; problems; afford; Rikke; back injury; lowered; last; make ends meet; small; harder; hard; think

Coding dictionaries for point 3 in the human-coded content analysis:

Thematic pro coding dictionary	10; 25; 1,000; 85,000; 355,200
Episodic pro coding dictionary	11; 31
Thematic con coding dictionary	10; 25; 26; 80
Episodic con coding dictionary	11; 35

Based on the human coding, we can correlate the proportion of correctly recollected information from the episodic and thematic frames as identified in the automatic content analysis and in the human-coded content analysis based on the dictionaries in Figure A3. Additionally, to further test the validity

of the automatic content analysis, we can also correlate the proportion of correctly recollected information from the episodic and thematic frames as identified in the automatic content analysis with the proportions identified in the human-coded content analysis when the human coders allowed for minor spelling mistakes in the words and numbers in the frames. The correlations are reported in Table A2. Entries are zero-order Pearson's coefficients.

TABLE A2 Correlation between measures based on automatic coding and human coding

Measures of correctly transmitted information from the episodic frame				
	Automatic coding	Human coding (no spelling mistakes allowed)	Human coding (spelling mistakes in words allowed)	Human coding (spelling mistakes in words and numbers allowed)
Automatic coding	-	0.93	0.94	0.94
Human coding (no spelling mistakes allowed)		-	0.99	0.99
Human coding (spelling mistakes in words allowed)			-	1
Human coding (spelling mistakes in words and numbers allowed)				-
Measures of correctly transmitted information from the thematic frame				
Automatic coding	-	0.91	0.91	0.91
Human coding (no spelling mistakes allowed)		-	0.99	0.99
Human coding (spelling mistakes in words allowed)			-	1
Human coding (spelling mistakes in words and numbers allowed)				-

Note. Entries are zero-order Pearson's correlations, n = 86 recollections.

As seen in Table A2, extremely high correlations are observed between the measures based on the automatic coding and the different measures based on the human coding. This supports the validity and reliability of the dictionary-based, automatic content analysis.

A1.7 Measurement details about the stemmed dictionaries for the analysis of robustness

As described in the methods section for Test 1, all of the key analyses reported in the main text were repeated using dictionaries in which all of the key words had been stemmed.[12] Stemming simplifies the key words in the dictionaries by removing the ends of the words.[13] In our analysis, the use of stemmed dictionaries ensures that slightly different forms and inflections of words referring to the same basic concept were coded.

To stem the key words in the dictionaries, we removed the inflection of the verbs, nouns, adjectives, and adverbs. If two key words were reduced to the same single root, we removed the duplicate from the list of key words. As the aim of the analysis of robustness using the stemmed dictionaries was to ensure that our results were robust to variations in inflection and the conjugation of irregular verbs and adjectives, we simply removed the end of the word without changing the base.

Figure A5 reports the coding dictionaries with the original Danish key words. The ends of the words that were removed in the stemming process are highlighted in bold. The results from the analysis of robustness using the stemmed dictionaries are reported in Online Appendix A2.2–3, A3.3, A3.5–6 (Test 1), A5.2 (Test 2), and A7.2 (Test 3).

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[12] See Grimmer and Stewart 2013, p. 272.
[13] Grimmer and Stewart 2013, p. 272.

Fig. A5 Stemmed coding dictionaries for the analysis of robustness

Thematic pro coding dictionary:	10; 25; 1.000; 85.000; 355.200; arbejde; årlig; beskæftigelse; besked**ent**; betal**e**; ekstra; foretræk**ker**; forudsæt**ter**; fritidsinteresse**r**; fuldtidsarbejde; hjem**me**; indtægt; konsulent; konsulenthus**et**; kpmg; kvit**te**; måned**en**; mind**re**; økonomisk; pct; Petersen; tal; tid**en**; tilbring**e**; tjen**e**; torben; udbyt**te**; undersøgelse; ydelse**rne**.
Episodic pro coding dictionary:	11; 31; ærlig; arbejde; årig**e**; betal**e**; brug**er**; computer; døgn**et**; find**e**; frem; internet**tet**; Jesper; job; Jørgensen; krigsspil; læng**ere**; lav**ere**; meste; opgiv**e**; penge; risiker**er**; sæt**te**; spil**le**; tal**t**; tilværels**en**.
Thematic con coding dictionary:	10; 25; 26; 80; Andersen; antal; arbejdsmarked**et**; beløb; besked**ne**; børn; dæk**ke**; decidere**t**; dokumenter**er**; fattigdom; fattig**e**; forsørge; fysisk**e**; helbredsproblem**er**; incitament**er**; konsulent; konsulenthus**et**; KPMG; leveomkostning**er**; massiv**e**; mennesk**er**; økonomisk**e**; pct; Peter; psykiske; rapport; ressourcesvag**e**; sænk**es**; stor**t**; svag**este**; undersøgelse; ydelse**rne**; lev**e**; virk**er**.
Episodic con coding dictionary:	11; 35; angst; arbejde; årig**e**; basal**e**; børn; dagligvare**r**; enlig; gerne; Hansen; hver; kamp; måltid; måned; min**e**; mor; næste; overskud; penge**ne**; problem**er**; råd; Rikke; rygskade; sænk**es**; sidst; slå; små; svær**ere**; svær**t**; tænk**e**.

A2 Supplemental Analyses for Test 1

A2.1 Paired samples t-tests for Figure 1

Figure 1 in the main text presents the proportion of correctly transmitted information from the episodic and thematic frames for transmissions 1–3 combined and by transmission round. Table A3 below reports the paired sample t-tests underlying the results illustrated in Figure 1 and the p-values for the mean differences described in the main text. The proportion of correctly transmitted information from the episodic and thematic frames, respectively, ranges from 0–1 ($min_{Episodic} = 0$, observed $max_{Episodic} = 0.88$, $min_{Thematic} = 0$, observed $max_{Thematic} = 0.85$).

TABLE A3 Paired samples t-test for Figure 1 in the main text

	Transmissions 1–3 combined	Trans-mission 1	Trans-mission 2	Trans-mission 3
	Fig. 3, Panel A	Fig. 3, Panel B		
Mean correct episodic transmission	0.17 (0.003)	0.25 (0.007)	0.16 (0.006)	0.11 (0.004)
Mean correct thematic transmission	0.12 (0.002)	0.18 (0.006)	0.10 (0.004)	0.08 (0.003)
Mean difference	0.05*** (0.004) [.42]	0.07*** (0.006) [.48]	0.05*** (0.005) [.56]	0.03*** (0.003) [.41]
n	1515	512	485	518

Note. Entries are means (with standard errors in parentheses) and mean differences estimated using paired samples t-test. As the standard errors are relatively small, they are reported with three decimals. For the mean differences: *p < 0.05, **p < 0.01, ***p < 0.001. Cohen's *d* for the effect size of the mean difference is reported in brackets.

A2.2 Analysis of robustness of paired samples t-tests for Figure 1 (w. stemmed dictionaries)

Table A4 repeats the analysis reported in Figure 1 in the main text and in Table A3 using the stemmed dictionaries in the coding of the content of the recollections. The proportion of correctly transmitted information from the episodic and thematic frames ranges from 0–1, where 0 = no information from the dictionary was transmitted and 1 = all information from the dictionary was transmitted (see Online Appendix 1.6 for further details on the stemming of the dictionaries).

Consistent with the findings reported in Figure 1, Panels A–B, we consistently observe in the main text that the respondents transmitted a larger proportion of the information from the episodic

frame than from the thematic frame. This applies both when the three transmissions are pooled and when they are analysed separately.[14]

TABLE A4 Analysis of robustness of paired samples t-test for Figure 1 using stemmed dictionaries

	Transmissions 1–3 combined	Trans-mission 1	Trans-mission 2	Trans-mission 3
	Replicating Fig. 3, Panel A	Replicating Fig. 3, Panel B		
Mean correct episodic transmission	0.20 (0.004)	0.28 (0.007)	0.18 (0.005)	0.13 (0.004)
Mean correct thematic transmission	0.14 (0.003)	0.21 (0.006)	0.12 (0.004)	0.09 (0.003)
Mean difference	0.06*** (0.003) [.49]	0.07*** (0.006) [.54]	0.06*** (0.005) [.64]	0.04*** (0.004) [.52]
n	1515	512	485	518

Note. Entries are means (with standard errors in parentheses) and mean differences estimated using paired samples t-test. As the standard errors are relatively small, they are reported with three decimals. For the mean differences: $*p < 0.05$, $**p < 0.01$, $***p < 0.001$. Cohen's *d* for the effect size of the mean difference is reported in brackets.

A2.3 Analysis of robustness of paired samples t-tests for Figure 1 for the 'pro' and 'con' conditions separately

The results in Figure 1 in the main text report the amount of transmitted information from the original episodic and thematic frames combined across the 'pro' and 'con' conditions of the articles. To investigate the generalizability of the finding when analysing the pro and con conditions separately, Table A5 replicates the analyses reported in Figure 1 in the main text and in Table A3 in the online appendix analysing the pro and con conditions separately. Finally, using the stemmed dictionaries, Table A6 replicates the analyses reported in Table A4 analysing the pro and con conditions separately.

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[14] Consistent with the findings reported in the main text, supplemental analyses show that the decay in the amount of correctly transmitted episodic information between rounds 1-2 and 2-3 respectively is slightly larger than the decay in the amount of thematic information (mean difference in decay = $0.03_{\text{rounds 1-2}}$ and $0.01_{\text{rounds 2-3}}$, $p < 0.001$ on a scale ranging from -1 to 1). Overall the substantial difference in these decay rates is relatively small. As emphasized in the main text the small difference in the decay rates most likely reflects that the amount of correctly transmitted thematic information overall is very low beginning already in round 1 and therefore reaches a form of "floor effect" almost from the beginning.

Entries in Tables A5–A6 are unstandardized OLS regression coefficients with robust standard errors in parentheses.

Overall, we find that the respondents correctly recollected a slightly larger proportion of the pro frames than the con frames ($M_{pro\ condition}$ = 0.16, $M_{con\ condition}$ = 0.13, mean difference = 0.03, p < 0.001 in an independent samples t-test).[15] Importantly, however, the results in Tables A5 and A6 consistently support that when analysing the pro and con conditions separately, the key findings in Figure 1 in the main text replicate. In both the pro and con conditions, information from the original episodic frame is consistently transmitted to a larger extent than information from the thematic frame.

TABLE A5 Analysis of robustness of paired samples t-test for Figure 1 for the 'pro' and 'con' conditions, separately

	Transmissions 1–3 combined	Trans-mission 1	Trans-mission 2	Trans-mission 3
	Replicating Fig. 3, Panel A	Replicating Fig. 3, Panel B		
'Pro' condition				
Mean correct episodic transmission	.18 (.004)	.24 (.008)	.16 (.006)	.12 (.005)
Mean correct thematic transmission	.15 (.003)	.20 (.007)	.13 (.005)	.11 (.004)
Mean difference	.03*** (.004) [.29]	.05*** (.008) [.38]	.03*** (.006) [.38]	.02** (.005) [.21]
N	782	258	247	277
'Con' condition				
Mean correct episodic transmission	.17 (.005)	.25 (.011)	.15 (.008)	.09 (.005)
Mean correct thematic transmission	.09 (.004)	.16 (.009)	.08 (.005)	.04 (.003)
Mean difference	.07*** (.004) [.55]	.09*** (.009) [.56]	.07*** (.007) [.75]	.05*** (0.005) [.73]
n	733	254	238	241

Note. Entries are means (with standard errors in parentheses) and mean differences estimated using paired samples t-test. As the standard errors are relatively small, they are reported with three decimals. For the mean differences: *p < 0.05, **p < 0.01, ***p < 0.001. Cohen's *d* for the effect size of the mean difference is reported in brackets.

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[15] This result replicates when using the stemmed dictionaries in the automatic content analysis ($M_{pro\ condition}$ = 0.19, $M_{con\ condition}$ = 0.16, mean difference = 0.02, p < 0.001, n = 1515 in an independent samples t-test).

TABLE A6 Analysis of robustness of paired samples t-test replicating Figure 1 for the pro and con conditions separately using stemmed dictionaries

	Transmissions 1–3 combined	Trans-mission 1	Trans-mission 2	Trans-mission 3
	Replicating Fig. 3, Panel A	Replicating Fig. 3, Panel B		
'Pro' condition				
Mean correct episodic transmission	.21 (.005)	.29 (0.009)	.20 (.007)	.15 (.006)
Mean correct thematic transmission	.16 (.004)	.22 (.008)	.14 (.005)	.12 (.004)
Mean difference	.05*** (.004) [.44]	.07*** (.008) [.51]	.06*** (.007) [.56]	.03*** (.005) [.40]
n	782	258	247	277
'Con' condition				
Mean correct episodic transmission	.20 (.006)	.30 (.012)	.018 (.009)	.12 (.006)
Mean correct thematic transmission	.12 (.004)	.20 (.009)	.10 (.005)	.06 (.003)
Mean difference	.08*** (.005) [.54]	.096*** (.009) [.57]	.08*** (0.008) [.73]	.05*** (.006) [.71]
n	733	254	238	241

Note. Entries are means (with standard errors in parentheses) and mean differences estimated using paired samples t-test. As the standard errors are relatively small, they are reported with three decimals. For the mean differences: $^*p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$. Cohen's *d* for the effect size of the mean difference is reported in brackets.

A2.4 Analysis of robustness of paired samples t-tests for Figure 1 by the order of the episodic and thematic frame in the news article

As explained in the main text, to mimic real-world news reports, each news article included both an episodic and a thematic part to illustrate the overall issue frame. As explained in the main text, to control for order effects, we randomly varied whether the episodic or thematic frame appeared first in each news article. Figure 1 in the main text shows the amount of transmitted information from the original episodic and thematic frames pooling the news articles in which the episodic frame appeared first and the news articles in which the thematic frame appeared first.

To investigate whether the findings in Figure 1 remain robust when we separate the experimental conditions by the order of the episodic and thematic frame in the news article, Table A7 replicates the analyses reported in Figure 1 and in Table A3 separately for the conditions in which

the episodic frame and thematic frames each appeared first in the news article. Finally, using the

stemmed dictionaries, Table A8 replicates the analyses reported in A7. The entries in Tables A7–A8

were calculated using paired samples t-tests and Cohen's *d*.

TABLE A7 Analysis of robustness of paired samples t-test for Figure 1 by the order of the episodic and thematic frame

	Transmissions 1–3 combined	Trans-mission 1	Trans-mission 2	Trans-mission 3
	Replicating Fig. 3, Panel A	**Replicating Fig. 3, Panel B**		
Episodic frame appeared first				
Mean correct episodic transmission	.17 (.005)	.25 (.010)	.16 (.007)	.11 (.005)
Mean correct thematic transmission	.11 (.003)	.16 (.008)	.09 (.004)	.07 (.004)
Mean difference	.06*** (.004) [.53]	.08*** (.008) [.58]	.07*** (.006) [.71]	.04*** (.005) [.52]
n	837	267	278	292
Thematic frame appeared first				
Mean correct episodic transmission	.17 (.005)	.25 (.009)	.15 (.007)	.10 (.005)
Mean correct thematic transmission	.13 (.004)	.20 (.008)	.02 (.006)	.08 (.005)
Mean difference	.04*** (.004) [.29]	.05*** (.008) [.36]	.03*** (.007) [.36]	.02** (0.005) [.27]
n	678	245	207	226

Note. Entries are means (with standard errors in parentheses) and mean differences estimated using paired samples t-test. As the standard errors are relatively small, they are reported with three decimals. For the mean differences: $^*p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$. Cohen's *d* for the effect size of the mean difference is reported in brackets.

TABLE A8 Analysis of robustness of paired samples t-test for Figure 1 by the order of the episodic and thematic frame (using stemmed dictionaries)

	Transmissions 1–3 combined	Trans-mission 1	Trans-mission 2	Trans-mission 3
	Replicating Fig. 3, Panel A	Replicating Fig. 3, Panel B		
Episodic frame appeared first				
Mean correct episodic transmission	.17 (.005)	.25 (.010)	.16 (.007)	.11 (.005)
Mean correct thematic transmission	.11 (.003)	.16 (.008)	.09 (.004)	.07 (.004)
Mean difference	.06*** (.004) [.59]	.08*** (.008) [.63]	.07*** (.006) [.80]	.04*** (.005) [.62]
n	837	267	278	292
Thematic frame appeared first				
Mean correct episodic transmission	.17 (.005)	.25 (.009)	.15 (.007)	.10 (.005)
Mean correct thematic transmission	.13 (.004)	.20 (.008)	.02 (.006)	.08 (.005)
Mean difference	.04*** (.004) [.36]	.05*** (.008) [.43]	.03*** (.007) [.44]	.02** (0.005) [.39]
n	678	245	207	226

Note. Entries are means (with standard errors in parentheses) and mean differences estimated using paired samples t-test. As the standard errors are relatively small, they are reported with three decimals. For the mean differences: $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$. Cohen's d for the effect size of the mean difference is reported in brackets.

A3 Supplemental Experimental study for Test 1

As emphasized in the main text, the aim of the follow up study for test 1 was to address concerns about the degree of causal traction in our research design. For example, because all of the original news stories included both episodic and thematic parts, one possible concern could be whether the automated content analysis of the recollections accidentally counts words from the respondents' paraphrasing of the original thematic frame as episodic and vice-versa.

A3.1 Research design and measures

To address this concern, we implemented a new experiment and fielded it to a new nationally representative sample of respondents who had not previously taken part in the study. In the experiment, the respondents were randomly assigned to read a news article with *either* one of the original episodic news frames *or* one of the original thematic news frames. Hence, the experiment had a total of four conditions. Figure A6.1 below shows the wording of the four frames in the news article as they were presented to the respondents. Figure A6.2 shows the original Danish version. As we use the same episodic and thematic frames as in Test 1, the same (successful) manipulation checks apply.

The respondents in the follow-up experiment recollected the frames after reading the following instruction: 'We now ask you to recollect the news story that you have just read. We ask you to recollect the story as accurately and literally as you can and include as many details from the article as possible. Don't be worried if you can't remember everything. We ask you to write as clearly as you can'.

The experiment was fielded in an online survey by YouGov in Denmark, October 8–21, 2013. A nationally representative sample was drawn for the agency's standing online web panel to match population on age (18–74), gender, geography, and education (n = 403, see Online Appendix A1.6

for sample characteristics).

Dependent measures. To test whether episodic frames were better recollected than thematic frames, we use two measures: First, we use the same automatic dictionary-based content analysis as in the previous analyses in Test 1. The proportion of correctly transmitted information from the episodic and thematic frames, respectively, ranges from 0–1 (observed $\min_{Episodic}$ = 0, observed $\max_{Episodic}$ = 0.94, observed $\min_{Thematic}$ = 0, observed $\max_{Thematic}$ = 0.50).

For our second measure, we use the raw count of recollected words. This provides us with an additional measure to probe the robustness of the findings from the automatic content analyses. The number of words recollected ranges from 0 to 147 (observed $\min_{Episodic}$ = 1, observed $\max_{Episodic}$ = 141, observed $\min_{Thematic}$ = 1, observed $\max_{Thematic}$ = 121). If episodic frames are recollected more, then the recollections of the episodic frames should be longer.

Control variables. To probe the robustness of the results from the experiment, we also measured the gender, age, and education of the respondents (i.e. the sender of the recollections). Gender was coded as a dichotomous variable (1 = female, 0 = male). Age was measured in years (mean = 46 years, SD = 16 years, min. = 18 years, max. = 92 years). Education was coded on a six-point scale including the categories 'primary and lower secondary school', 'vocational training', 'high school', 'short higher education', 'medium-long higher education', and 'long higher education'. Answers were recoded to range from 0–1, higher values indicating higher education, respectively ((M = 0.34, SD = 0.33).

A3.1.1 The wording of the original episodic and thematic frames

Fig. A6.1 The wording of the original episodic and thematic frames (English translation)

	Issue frame	
	Pro financial motivation frame	**Con destitution frame**
Episodic frame	**Lower cash benefits push recipients into employment** By Søren Frederiksen Parliament is currently discussing a proposal to reduce cash benefits. The new proposal aims to lower benefits to a level where the 'profit' from taking a low-paid, unskilled job will always be at least DKK 2,000. *If that happens, it will no longer make financial sense for cash benefit recipients like 31-year-old Jesper Jørgensen to play computer games instead of working. Jesper Jørgensen has been living off of cash benefits for 11 years and spends most of the day playing war games over the Internet. He does not want to give up his way of life because he risks losing money by working. 'So frankly speaking, I don't see why I should. But if the benefits were lower and it made sense to work, I would probably find a job', Jesper Jørgensen explains.*	**Lower cash benefits increase poverty** By Søren Frederiksen Parliament is currently discussing a proposal to reduce cash benefits. The new proposal aims to lower benefits to a level where the 'profit' from taking a low-paid, unskilled job will always be at least DKK 2,000. *If that happens, it will become harder for cash benefit recipients like 35-year-old Rikke Hansen to afford basic necessities at the end of the month. Rikke Hansen is a single mother of three small children and has been living off of cash benefits for 11 years. She wants to work, but it is difficult for her to find a job due to a back injury and problems with anxiety. Every month is a struggle to make ends meet. 'If the cash benefits are lowered, I'll only be able to think one meal ahead for my children and myself', Rikke Hansen explains.*
Thematic frame	**Lower cash benefits push recipients into employment** By Søren Frederiksen Parliament is currently discussing a proposal to reduce cash benefits. The new proposal aims to lower benefits to a level where the 'profit' from taking a low-paid, unskilled job will always be at least DKK 2,000. *Today, many long-term cash benefit recipients stand to gain little financially from working. According to recent estimates, 85,000 cash benefit recipients would earn less than DKK 1,000/month extra by quitting life on welfare. For some, it would require an annual income of DKK 355,200 for full-time work to pay off. According to a study by KPMG Consultancy, this may explain why many cash benefit recipients prefer to stay home and spend time on their hobbies.* *'A 10 per cent cut in benefits would send approx. 25 per cent of cash benefit recipients into employment', explains consultant Torben Petersen.*	**Lower cash benefits increase poverty** By Søren Frederiksen Parliament is currently discussing a proposal to reduce cash benefits. The new proposal aims to lower benefits to a level where the 'profit' from taking a low-paid, unskilled job will always be at least DKK 2,000. *Today, many long-term recipients are receiving an amount of money that does not cover even the most modest costs of living. According to a new study, 26 per cent of recipients are outright poor, and many in this group are providing for children. A report from KPMG Consultancy documents that 80 per cent of the most challenged cash benefit recipients struggle with massive physical and mental health problems, and a cut in benefits would not bring them closer to the labour market. This is because financial incentives have no effect on disadvantaged people.* *'A 10 per cent cut in benefits would push approx. 25 per cent more benefit recipients into poverty', explains consultant Peter Andersen.*

Note. As the respondents in Test 1 were Danish, the frames were presented in Danish.

Fig. A6.2 The wording of the original episodic and thematic frames (in original Danish)

	Issue frame	
	Pro financial motivation frame	**Con destitution frame**
Episodic frame	**Lavere ydelser får kontanthjælpsmodtagere i job** Af Søren Frederiksen Politikerne på Christiansborg diskuterer i øjeblikket et forslag om at sænke kontanthjælpen. Det nye forslag går ud på at sænke ydelserne, så gevinsten ved at tage et lavtlønnet ufaglært job altid vil være minimum 2.000 kr. om måneden. *Hvis det sker, vil det ikke længere kunne betale sig for kontanthjælpsmodtagere som den 31-årige Jesper Jørgensen at spille computer frem for at gå på arbejde. Jesper Jørgensen, der har været på kontanthjælp i 11 år, bruger i dag det meste af døgnet på at spille krigsspil over internettet. Han vil ikke opgive tilværelsen på kontanthjælp, fordi han risikerer at sætte penge til ved at gå på arbejde. "Så jeg kan ærlig talt ikke se, hvorfor jeg skulle gøre det. Men jeg ville nok finde et job, hvis kontanthjælpen var lavere, så det kunne betale sig at arbejde," siger Jesper Jørgensen.*	**Lavere kontanthjælp skaber øget fattigdom** By Søren Frederiksen Politikerne på Christiansborg diskuterer i øjeblikket et forslag om at sænke kontanthjælpen. Det nye forslag går ud på at sænke ydelserne, så gevinsten ved at tage et lavtlønnet ufaglært job altid vil være minimum 2.000 kr. om måneden. *Hvis det sker, vil det blive sværere for kontanthjælpsmodtagere som den 35-årige Rikke Hansen at få råd til basale dagligvarer sidst på måneden. Rikke Hansen er enlig mor til tre små børn og har været på kontanthjælp i 11 år. Hun vil gerne have et arbejde, men har svært ved at få det på grund af en rygskade og problemer med angst, så for Rikke Hansen er hver måned en kamp for at få pengene til at slå til. "Hvis kontanthjælpen sænkes, vil jeg kun have overskud til at tænke på det næste måltid til mig selv og mine børn," siger Rikke Hansen.*
Thematic frame	**Lavere ydelser får kontanthjælpsmodtagere i job** Af Søren Frederiksen Politikerne på Christiansborg diskuterer i øjeblikket et forslag om at sænke kontanthjælpen. Det nye forslag går ud på at sænke ydelserne, så gevinsten ved at tage et lavtlønnet ufaglært job altid vil være minimum 2.000 kr. om måneden. *I dag er der mange langtidsledige kontanthjælpsmodtagere, som kun vil få et beskedent økonomisk udbytte af at arbejde. Ifølge nye tal vil 85.000 kontanthjælpsmodtagere kunne tjene mindre end 1.000 kr. ekstra om måneden ved at kvitte kontanthjælpen, og i nogle tilfælde forudsætter det en årlig indtægt på helt op til 355.200 kr., hvis fuldtidsarbejde skal kunne betale sig. Måske er det årsagen til, at mange kontanthjælpsmodtagere, ifølge en undersøgelse fra konsulenthuset KPMG, foretrækker at blive hjemme og tilbringe tiden med fritidsinteresser. "Hvis ydelserne sættes 10 pct. ned, vil ca. 25 pct. af kontanthjælpsmodtagerne komme i beskæftigelse," forklarer konsulent Torben Petersen.*	**Lavere kontanthjælp skaber øget fattigdom** Af Søren Frederiksen Politikerne på Christiansborg diskuterer i øjeblikket et forslag om at sænke kontanthjælpen. Det nye forslag går ud på at sænke ydelserne, så gevinsten ved at tage et lavtlønnet ufaglært job altid vil være minimum 2.000 kr. om måneden. *I dag lever et stort antal langtidsledige kontanthjælpsmodtagere for beløb, der ikke rækker til at dække selv beskedne leveomkostninger. En ny undersøgelse viser, at 26 pct. af kontanthjælpsmodtagerne er decideret fattige, og at mange i denne gruppe har børn at forsørge. Samtidig dokumenterer en rapport fra konsulenthuset KPMG, at 80 pct. af de svageste kontanthjælpsmodtagere har massive fysiske og psykiske helbredsproblemer og ikke vil komme tættere på arbejdsmarkedet, hvis kontanthjælpen sættes ned. Det skyldes, at økonomiske incitamenter ikke virker på ressourcesvage mennesker. "Hvis ydelserne sænkes med 10 pct., vil ca. 25 pct. flere kontanthjælpsmodtagere leve i fattigdom," forklarer konsulent Peter Andersen.*

A3.2 Main results

Figure A7, Panel A, displays the proportion of correctly recollected information from the original episodic and thematic frames as measured using the automatic, dictionary-based content analysis. The proportion of correctly transmitted information from the episodic and thematic frames, respectively, ranges from 0–1 (observed $\min_{Episodic} = 0$, observed $\max_{Episodic} = 0.94$, observed $\min_{Thematic} = 0$, observed $\max_{Thematic} = 0.50$). Table A9, Model 1, shows the OLS regression results that are illustrated in Figure A7, Panel A. Model 2 in Table A9 reports the analysis of robustness controlling for the age, gender, and education of the sender. In Table A9, exposure to the thematic frame is coded as reference category (0) on the dichotomous variable 'Episodic frame' (episodic frame = 1). All of the control variables are measured from 0–1 except for age (measured in years). In Table A9, we report unstandardized regression coefficients from OLS regressions with standard errors in parentheses.

The results in Figure A7, Panel A, and Table A9, Model 1, show that the respondents correctly recollected a larger proportion of the original episodic frames than the thematic frames (b = 0.10, *p* < 0.001). The analysis of robustness in Table A9, Models 2–4, support that the results in Figure A7, Panel A, replicate controlling for the sender's education, gender, and age. Thus, using a new research design with strong internal validity and causal traction, these findings replicate the finding in Test 1 in the main text.

Figure A7, Panel B, presents the total number of words recollected by the respondents in the episodic and thematic frame conditions (observed $\min_{Episodic} = 1$, observed $\max_{Episodic} = 141$, $\text{mean}_{Episodic} = 40.43$; observed $\min_{Thematic} = 1$, observed $\max_{Thematic} = 121$, $\text{mean}_{Thematic} = 28.18$). Table A9, Model 3, shows the OLS regression results that are illustrated in Figure A7, Panel B. Model 4 in Table A9 reports the analysis of robustness controlling for the age, gender, and education of the sender. The results are consistent with the findings in Panel A. The results in Model 3 show that

individuals who read an episodic frame recollected a higher number of words than those who read a thematic frame (b = 9.57, *p* = 0.001). The analysis of robustness in Table A9, Model 4, supports that the results in Figure A7, Panel B, replicate controlling for the respondent's education, gender, and age.

In sum, using a well-powered representative sample and an experimental design ensuring strong internal validity, the supplemental experimental study provide further support for H1 by replicating that episodic frames are recollected more in the citizen-to-citizen transmission of media news stories. These findings are consistent with the argument for an 'episodic' bias for the encoding and retrieval of vivid, intimate social information.

Fig. A7 Frame recollection by episodic and thematic frame condition
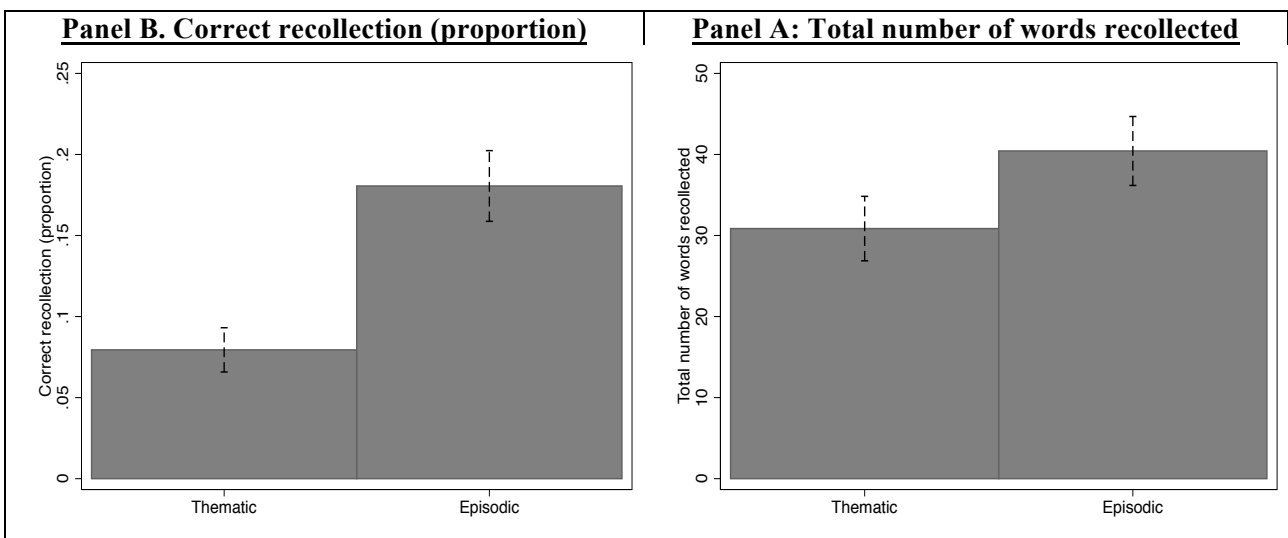
Note. Entries were estimated using OLS regression with robust standard errors. They are illustrated with 95% confidence intervals. In Panels A–B, n = 403.

TABLE A9 Effect of episodic frame exposure on frame recollection

	Correct frame recollection (proportion)		Total number of recollected words	
	M1	M2	M3	M4
Episodic frame	0.10*** (0.01)	0.10*** (0.01)	9.57** (2.96)	10.08** (2.92)
Sender's education		0.05* (0.02)		14.16* (4.86)
Sender female		0.04** (0.01)		5.27 (2.93)
Sender's age		-0.00 (0.00)		-0.15 (0.10)
Constant	0.08*** (0.01)	0.05 (0.03)	30.86*** (2.02)	30.27*** (5.97)
R^2	0.126	0.156	0.025	0.069
n	403	403	403	403

Note. Entries are unstandardized OLS regression coefficients with robust standard errors in parentheses. The findings illustrated in Figure A7 are based on the results in Table A9, Models 1 and 3. All of the variables are coded to range between 0 and 1 except for age, which is measured in years. $^*p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

A3.3 Analysis of robustness with stemmed dictionaries

Table A10 repeats the analysis reported in Table A9, Models 2–3, and in the result section for Test 1 in the main text using the stemmed dictionaries. The proportion of correctly recollected information from the episodic and thematic frames, respectively, ranges from 0–1, where 0 = no information from the dictionary was recollected and 1 = all information from the dictionary was recollected.

TABLE A10 Effect of the episodic frame on correct recollection (using stemmed dictionaries)

	Correct frame recollection (proportion)	
	M1	M2
Episodic frame	0.11*** (0.01)	0.11*** (0.01)
Sender's education		0.06* (0.02)
Sender female		0.04** (0.01)
Sender's age		-0.00 (0.00)
Constant	0.10*** (0.01)	0.07* (0.03)
R^2	0.117	0.151
n	403	403

Note. Entries are unstandardized OLS regression coefficients with standard errors reported in parentheses. All variables are coded to range between 0 and 1 except for age, which is measured in years. $^*p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

The findings in Table A10, Model 1, replicate the results in Table A10 and the results described in the main text in the result section for Test 1: The respondents correctly recollected a larger proportion of the information from the original episodic frames than the thematic frames (b = 0.11, $p < 0.001$). As can be seen in Table A10, Model 2, this result is robust when controlling for the sender's education, gender, and age. These results support the robustness of the findings reported in Table A10 and in the main text in the result section for test 1.

A3.4 Analysis of robustness investigating frame direction (pro/con) as moderator

To investigate whether the effect of the episodic frame condition on frame recollection was moderated by whether the respondents read a pro or a con frame, Table A11 shows the moderating effect of

reading a pro frame (relative to a con frame) on the impact of the episodic frame condition on correct frame recollection as measured through the automatic content analysis (Models 1–2) and the raw number of words recollected (Models 3–4).

Entries in Table A11 are unstandardized OLS regression coefficients. The variable pro frame is coded as a dichotomous variable, where 1 = pro frame and 0 = con frame. Exposure to the thematic frame is coded as reference category (0) on the dichotomous variable 'Episodic frame' (episodic frame = 1). All of the variables are measured from 0–1 except for age (measured in years) and the number of recollected words, ranging from 1–141.

TABLE A11 The effect of the episodic frame on correct recollection moderated by frame direction

	Correct frame recollection (proportion)		Total number of recollected words	
	M1	M2	M3	M4
Episodic frame	0.13*** (0.02)	0.13*** (0.02)	14.12*** (4.19)	14.55*** (4.05)
Pro frame	0.04** (0.01)	0.03* (0.01)	5.19 (4.04)	4.63 (3.94)
Episodic × pro frame	-0.05* (0.03)	-0.05 (0.03)	-8.96 (5.92)	-8.83 (5.72)
Sender's education		0.05* (0.02)		14.58** (4.80)
Sender female		0.04** (0.01)		4.87 (2.91)
Sender's age		-0.00 (0.00)		24.56*** (7.38)
Constant	0.06*** (0.01)	0.03 (0.03)	28.18*** (2.87)	-0.15 (0.10)
R^2	0.135	0.164	0.031	0.075
n	403	403	403	403

Note. Entries are unstandardized OLS regression coefficients with robust standard errors in parentheses. All variables are coded to range between 0 and 1 except for age, which is measured in years. *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

The findings in Table A11, Model 1, indicate that the effect of the episodic frame on correct frame recollection was weaker among respondents reading a pro frame than a con frame (b Episodic frame × pro frame = -0.05, $p = 0.046$). As shown in Model 2 in Table A11, however, this interaction became statistically insignificant both when controlling for the sender's education, gender, and age was

included (b $_{\text{Episodic frame} \times \text{pro frame}}$ = -0.05, p = 0.054). Furthermore, the analysis of robustness using the stemmed dictionaries in the automatic content analysis of correct frame recollection also show no moderating effect of the direction of the frame on correct frame recollection (see Table A12 in Online Appendix A3.5). Thus, the significant interaction in Model 1 does not replicate with different model specifications and slightly different measures.

Finally, the results in Models 3–4 show no statistically significant moderating effect of the direction of the frame on the total number of words recollected, neither in the simple model without control variables (b $_{\text{Episodic frame} \times \text{pro frame}}$ = -8.96, p = 0.131) nor in the analysis of robustness controlling for the sender's education, gender, and age (b $_{\text{Episodic frame} \times \text{pro frame}}$ = -8.26, p = 0.124). Overall, the findings in Table A11 thus support that the effect of the episodic condition on frame recollection do not differ across the pro and con conditions.

A3.5 Analysis of robustness investigating frame direction (pro/con) as moderator (with stemmed dictionaries)

To provide an analysis of robustness of the findings in Table A11 (Models 1–2), Table A12 shows the moderating effect of reading a pro frame (relative to a con frame) on the impact of the episodic frame condition on correct frame recollection as measured through the automatic content analysis when using the stemmed dictionaries.

The entries in Table A12 are unstandardized OLS regression coefficients. As in Table A11, the variable pro frame is coded as a dichotomous variable, where 1 = pro frame and 0 = con frame. Exposure to the thematic frame is coded as reference category (0) on the dichotomous variable 'Episodic frame' (episodic frame = 1). All of the variables are measured from 0–1 except for age (measured in years).

Across Models 1–2, the findings in Table A12 consistently support that the direction of the frame (pro/con frame) does not moderate the effect of the episodic frame on correct frame recollection as measured in the automatic content analysis using the stemmed dictionaries (M1: b $_{\text{Episodic frame} \times \text{pro frame}}$ = -0.04, p = 0.156, M2: b $_{\text{Episodic frame} \times \text{pro frame}}$ = -0.04, p = 0.181). Thus, the analysis of robustness supports the main pattern of the findings in Online Appendix A3.4.

TABLE A12 The effect of the episodic frame on correct recollection moderated by frame direction (using the stemmed dictionaries)

	Correct frame recollection (proportion)	
	M1	M2
Episodic frame	0.13*** (0.02)	0.13*** (0.02)
Pro frame	0.03 (0.02)	0.03 (0.02)
Episodic × pro frame	-0.04 (0.03)	-0.04 (0.03)
Sender's education		0.06* (0.02)
Sender female		0.04** (0.01)
Sender's age		-0.00 (0.00)
Constant	0.08*** (0.01)	0.06 (0.03)
R^2	0.122	0.155
n	403	403

Note. Entries are unstandardized OLS regression coefficients with robust standard errors in parentheses. All variables are coded to range between 0 and 1 except for age, which is measured in years. $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

A3.6 Analysis of episodic vs. thematic frame exposure on policy support

As in the main study (see Test 2 in the main text), the experimental study included a measure of opinions about the proposal covered in the frames. Specifically, to measure the effect of the frames on opinion, the respondents were asked: 'Do you support or oppose the proposal to reduce social welfare benefits?' Answers were obtained on a 7-point scale and recoded to range from 0–1, higher values indicating higher support ('Don't know' were excluded).

In Test 2 in the main text, we analyse the effect of episodic and thematic frame information on opinions. The present analyses differ in a very important way: In Test 2 in the main text we analyse opinion effects in the second step of the communication flow. The present analysis from the experimental study examines opinion effects in the first step of the communication flow, as the experimental design of this study allows us to gauge how direct exposure to episodic and thematic news stories, respectively, shapes opinions (specifically, this is because respondents have only read either an episodic or thematic news story, whereas the main study bundled both frames into the same news story and, hence, this particular analysis cannot be performed in the main study; see also the Methods section for Test 2 in the main text).

We began by validating that the pro and con frames were effective in shaping support for the policy proposal to ensure that any absence of difference in the effect of episodic and thematic frames was not simply caused by ineffective issue frames. Replicating the classical framing effect in past studies, we observed that policy support was higher among individuals reading the financial pro frame than the destitution con frame ($M_{pro} = .55$, $M_{con} = .41$, $p < 0.001$, n = 403).

This leads us to the test of whether episodic frames are more persuasive than thematic frames. To this end, Table A13 reveals the effect of exposure to the episodic frame (compared to the thematic frame) on support for the policy proposal among participants who were exposed to a pro financial motivation frame (Model 1) and a con social destitution frame (Model 2). Models 3–4 report the

analysis of robustness controlling gender, age, education, and income. Policy support is measured on a scale ranging from 0–1, higher values indicating higher support for the policy proposal. Exposure to the thematic frame is coded as reference category on the dichotomous variable 'Episodic frame'. Education is coded on a 6-point scale with endpoints labelled 'primary and lower secondary school' and 'long higher education'. All variables are measured from 0–1, except for age (measured in years).

If episodic frames are more persuasive than thematic frames, we should expect the coefficient to be positive and significant in Models 1 and 3 (i.e. showing that episodic pro frames lead to more support) and negative and significant in Models 2 and 4 (i.e. showing that episodic con frames lead to less support). As can be seen, while the coefficients are in the expected direction in Models 1–2, none of them are significant. When adding control variables in Models 3–4, the effect of the episodic con frame (Model 4) changes sign but none of the effects are significant. To provide a standardized measure of the effect size of episodic versus thematic framing, we can calculate Cohen's d on the basis of independent samples t-test (corresponding to Table A13, Models 1 and 2 but without robust standard errors). In this case, Cohen's d in the case of con frames is -0.03 (95 per cent confidence interval [-.31; .25]) and 0.14 (95 per cent confidence interval [-.14; .41]) for pro frames, which suggests, at best, a small non-significant effect.

TABLE A13 The effect of the episodic frame on support for the policy proposal

	Model 1 (Pro frame	Model 2 (Con frame)	Model 3 (Pro frame)	Model 4 (Con frame)
Episodic frame	0.05 (0.05)	-0.01 (0.04)	0.04 (0.05)	0.01 (0.04)
Education			0.08 (0.07)	0.25*** (0.06)
Female			-0.06 (0.05)	-0.06 (0.04)
Age			-0.00 (0.00)	0.00 (0.00)
Constant	0.53*** (0.03)	0.41*** (0.03)	0.56*** (0.09)	0.30** (0.09)
R^2	0.005	0.000	0.018	0.083
n	204	199	204	199

Note. Entries are unstandardized OLS regression coefficients with robust standard errors in parentheses. Policy support is measured on a scale ranging from 0–1, higher values indicating stronger support for the policy proposal. Exposure to the thematic frame is coded as the reference category for the dichotomous variable 'Episodic frame'. All variables are measured from 0–1 except for age, which is measured in years. $^*p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

These effects can be viewed as evidence for the claim in the existing literature that, against conventional wisdom, episodic frames do not have stronger effect on policy opinions than thematic frames in the first step of the communication flow.[16,17] However, because this claim implies the absence of an effect, it can be argued that it is more appropriate to utilize statistical tests of equality to directly establish the absence of a difference in the effect of episodic and thematic frames on policy opinions. Hence, regression models and independent sample t-tests are classical statistical tests of differences that assume as the null hypothesis that there is no difference between the frames and then evaluates the evidence against this. If the expectation is that there is indeed no difference between the frames, however, then we cannot assume this as the null hypothesis in our models. Instead, we should assume as the null hypothesis that there is a difference between the frames and evaluate the evidence against this assumption. Equivalence tests offer a method for this.[18] Using the procedure offered by Weber and Popova[19] we performed equivalence tests for the difference between episodic and thematic frames for (1) both con and pro frames and (2) under the assumption that the difference equalled a Cohen's *d* of .10, .30, and .50, respectively (corresponding to small, mid-sized, and large differences, respectively). In the case of pro-frames, the p-values for these assumed differences are p = .433, p = .005, and p < .001, respectively. In the case of con frames, the p-values are p = .183, p = .001, and p < .001, respectively. Hence, the current data allow us to reject the null hypotheses that there are large

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[16] Aarøe 2011; Gross 2008, though see Springer and Hartwood 2015.
[17] It should be noted that, as always, there are some potentially confounding factors. In particular, it is possible that respondents had settled opinions on this specific issue and, hence, were less moved by the frames than on other potential issues. While such a possibility is not entirely consistent with the fact the people are moved by pro and con frames, it should be noted that the pro and con framing of the article was more salient than the episodic and thematic frames (specifically, it was already identifiable from the headline). This difference in salience might be particularly important because of the online (rather than laboratory) nature of the current study. Whether or not this or other confounding factors are contributing to the null results, it is still consistent with some findings in the literature and suggests that the difference between is not as easy to identify in the first communication step as one might expect.
[18] E.g. Weber and Popova 2012; see also Lakens 2017, pp. 355-6, for a general discussion of the use of equivalence tests to provide support for the null hypothesis.
[19] Weber and Popova 2012

differences of $d = .30$ or $.50$ between episodic and thematic frames. Yet, with the current data we cannot reject the null hypotheses of a small difference of $d = .10$ between episodic and thematic frames.

In a sense, this mixed conclusion is consistent with the overall evidence in the existing literature.[20] As summarized in the main text, the findings in the literature are mixed with some, but certainly not all studies, suggesting the existence of a difference in the strength of episodic and thematic frames in the first step of the communication flow: Gross[21] and Aarøe[22] found no difference in the direct effect of episodic and thematic frames on policy support in the first step of the communication flow. Springer and Harwood[23] found that 'participants exposed to episodic frames were significantly more likely to endorse message-consistent attitudes than participants exposed to a thematic frame.' Finally, Spence[24] found that only on one of three reported policy measures the episodic frame had a significant effect while the effect of the thematic frame is non-significant.

In our view, this mixed evidence in the extant literature on the effect of episodic and thematic frames on policy opinions is consistent with the notion that cognitive biases might not play as large a role in the first step as in the second step of the communication flow (see also the main text for discussion).

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[20] e.g. Gross 2008; Aarøe 2011; Spence 2010; Springer and Hartwood 2015.
[21] Gross 2008
[22] Aarøe 2011
[23] Springer and Hartwood 2015, p. 1, see also p. 10.
[24] Spence 2010, p. 262

A4 Measurement Details for Test 2

A4.1 Measures of control variables included in Test 2

As explained in the main text, the variation in Test 2 in the amount of information the respondents received from the original episodic and thematic frames is observed rather than experimentally varied. To increase the internal validity, we therefore include a very large set of control variables measuring both the characteristics of the respondent who wrote the recollection and the respondent who received it.

Specifically, we control gender, age, education, need for cognition, need for affect, and the political ideology of both the second-step sender and receiver. Finally, we also control for the opinion on the proposal of the sender.

In all three surveys, the education of the sender and receiver, respectively, was coded on a 7-point scale including the categories 'primary and lower secondary school', 'vocational training', 'high school', 'short higher education', 'medium-long higher education', 'long higher education', and 'PhD degree'. Answers were recoded to range from 0–1, higher values indicating higher education of the receiver and sender, respectively (($M_{\text{Sender education}} = 0.39$, $SD_{\text{Sender education}} = 0.31$, $M_{\text{Receiver education}} = 0.37$, $SD_{\text{Receiver NfC}} = 0.30$).

Need for Cognition (NfC) refers to an individual's 'tendency to engage in and enjoy effortful cognitive activity'.[25] To measure the need for cognition, we rely on a Danish version of the two standard items in the ANES time series from the original battery.[26] Specifically, the respondents answered the following questions: a) 'Some people like to be responsible for handling situations that require that they always think very carefully, and other people don't like to be responsible for situations like that. Which of the following statements are most characteristic of you?' The

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[25] Cacioppo and Pettery 1982, p. 116.
[26] Bizer et al. 2000.

respondents could choose between the following answers: 'I like being responsible for handling situations that require that I always think very carefully' or 'I don't like being responsible for handling situations that require that I always think very carefully'. b) 'Some people prefer to solve simple problems instead of complex ones, whereas others prefer to solve more complex problems. Which type of problem do you prefer to solve?' The following answers were offered: 'I prefer to solve simple problems' and 'I prefer to solve complex problems'. Answers were summed to a reliable scale (r = 0.39) ranging from 0–1, higher values indicating greater need for cognition ($M_{Sender\ NfC}$ = 0.73, $SD_{Sender\ NfC}$ = 0.36, $M_{Receiver\ NfC}$ = 0.71, $SD_{Receiver\ NfC}$ = 0.37).

In line with the need for cognition, the need for affect (NfA) is a measure of motivation to engage in effortful cognitive activity (Appel, Gnambs, and Maio 2012). Need for affect is a measure of 'individual differences in the tendency to approach or avoid emotion-inducing situations and activities' (Appel, Grambs, and Maio 2012: 418). Specifically, NfA was measured using five items from the NfA Questionnaire (Maio and Esses 2001). The respondents were asked to indicate how much they agreed or disagreed with the following statements: 'I feel I need to experience strong emotions regularly', 'Emotions help people get along in life', 'I think it's important to explore my feelings', and 'I find strong emotions overwhelming and therefore try to avoid them' (reverse-coded). Answers were measured on a 7-point scale with end points labelled 'completely disagree' and 'completely agree'. The items were summed to a reliable scale (α = 0.78) ranging from 0–1, higher values indicating a higher need for affect ($M_{Sender\ NfA}$ = 0.63, $SD_{Sender\ NfA}$ = 0.17, $M_{Receiver\ NfA}$ = 0.63, $SD_{Receiver\ NfA}$ = 0.17).

Political ideology was measured using self-placement on a 7-point, left–right scale. Specifically, the respondents answered the following question: 'In politics people talk about left and right. Do you think of yourself as either left-wing or right-wing?' Answers were obtained on a 7-point scale with endpoints labelled 'Extremely left-wing' and 'Extremely right-wing' and recoded to

range from 0–1, higher values indicating a more right-wing ideological self-placement ($M_{\text{Sender ideology}}$ = 0.49, $SD_{\text{Sender ideology}}$ = 0.23, $M_{\text{Receiver ideology}}$ = 0.49, $SD_{\text{Receiver ideology}}$ = 0.23).

The ages of the sender and recipient were measured in years, ranging from 18–74 ($M_{\text{Sender age}}$ = 43 years, $SD_{\text{Sender age}}$ = 15 years, $M_{\text{Receiver age}}$ = 44 years, $SD_{\text{Receiver age}}$ = 15 years).

A5 Supplemental Analyses for Test 2

A5.1 Table 1 including coefficients for the control variables

Table A14 reports the results from Table 1 in the main text, including the coefficients for the control variables that are not shown in Table 1 because of space limitations. All variables range from 0–1 except for age, which is measured in years. As in Table 1, the simple model reported in Table A14, Models 1–3, includes control for the gender, age, education, and ideology of the second-step senders and receivers. As in Table 1, the extended model reported in Table A14, Models 4–6, further adds control for the need for cognition and NfA of the second-step sender and receiver as well as the opinion on the proposal of the second-step sender.

TABLE A14 Table 1 including the coefficients for the control variables not shown in the main text

	Support for the proposal					
	Transmissions 2–3 M1	Transmission 2 M2	Transmission 3 M3	Transmissions 2–3 M4	Transmission 2 M5	Transmission 3 M6
Pro frame	0.02 (0.04)	0.06 (0.06)	-0.03 (0.05)	0.03 (0.04)	0.06 (0.06)	-0.03 (0.05)
Episodic input	-0.30** (0.11)	-0.22 (0.14)	-0.37 (0.21)	-0.28* (0.11)	-0.24 (0.14)	-0.34 (0.22)
Pro × Episodic input	0.40* (0.16)	0.25 (0.21)	0.65* (0.28)	0.38* (0.16)	0.27 (0.21)	0.68* (0.30)
Thematic input	0.13 (0.19)	0.23 (0.22)	-0.20 (0.35)	0.11 (0.19)	0.26 (0.21)	-0.28 (0.37)
Pro × Thematic input	-0.20 (0.24)	-0.30 (0.30)	0.05 (0.43)	-0.16 (0.24)	-0.29 (0.29)	0.13 (0.45)
Sender's gender (1 = female)	0.01 (0.02)	0.02 (0.03)	0.00 (0.03)	0.01 (0.02)	0.03 (0.03)	0.00 (0.03)
Sender's age	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	-0.00* (0.00)
Sender's ideology	0.04 (0.04)	0.10 (0.06)	-0.01 (0.06)	0.05 (0.05)	0.08 (0.07)	0.01 (0.07)
Sender's education	0.01 (0.03)	0.05 (0.04)	-0.00 (0.05)	-0.00 (0.03)	0.05 (0.05)	-0.02 (0.05)
Receiver's gender (1 = female)	-0.04* (0.02)	-0.05 (0.03)	-0.03 (0.03)	-0.02 (0.02)	-0.04 (0.03)	-0.01 (0.03)
Receiver's age	-0.00*** (0.00)	-0.00** (0.00)	-0.00 (0.00)	-0.00*** (0.00)	-0.00** (0.00)	-0.00 (0.00)
Receiver's ideology	0.69*** (0.04)	0.67*** (0.06)	0.72*** (0.06)	0.68*** (0.04)	0.67*** (0.06)	0.68*** (0.06)
Receiver's education	0.07* (0.03)	0.05 (0.04)	0.08 (0.05)	0.06 (0.03)	0.02 (0.04)	0.08 (0.05)
Receiver's NfA				-0.02 (0.06)	0.07 (0.08)	-0.14 (0.09)
Receiver's NfC				0.06* (0.03)	0.06 (0.04)	0.05 (0.04)
Sender's policy opinion				-0.03 (0.03)	-0.01 (0.05)	-0.04 (0.05)
Sender's NfA				-0.09 (0.06)	-0.11 (0.09)	-0.05 (0.08)
Sender's NfC				0.03 (0.03)	-0.01 (0.04)	0.06 (0.04)
Constant	0.23*** (0.05)	0.14 (0.08)	0.30*** (0.07)	0.25*** (0.08)	0.14 (0.11)	0.38*** (0.10)
n	897	444	453	863	444	419
Adj. R^2	0.268	0.254	0.275	0.266	0.256	0.271

Note. Entries are unstandardized OLS regression coefficients with robust standard errors in parentheses. All variables range between 0 and 1 except for age, which was measured in years. $^*p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

A5.2 Analysis of robustness for Table 1 using stemmed dictionaries

Table A15 repeats the analysis presented in Table 1 in the main text and in Table A14 using the stemmed dictionaries in the coding of the content of the recollections that the respondents read before being asked their opinion about the policy. The amount of information transmitted to the respondents from the original episodic and thematic frames, respectively, ranges from 0–1, where 0 = none of the information from the dictionary was transmitted and 1 = all of the information from the dictionary was transmitted (see Online Appendix A1.7 for further details on the stemming of the dictionaries).

The findings in Table A15 replicate the results reported in Table 1 in the main text and in Table A14 in the Online Appendix. The effect of the issue frame on the support for the policy proposal is moderated by the amount of information received by the respondent from the original episodic frame. Specifically, the effect of the issue frame on policy support increases as the respondents receive a higher amount of information from the original episodic frame. In contrast, the amount of information received by the respondents from the original thematic frame has no influence on the effect of the issue frame on the support for the policy proposal.

TABLE A15 Analysis of robustness replicating Table 1 in the main text using stemmed dictionaries

	Support for the proposal					
	Transmissions 2–3 M1	Transmission 2 M2	Transmission 3 M3	Transmissions 2–3 M4	Transmission 2 M5	Transmission 3 M6
Pro	0.01 (0.04)	0.04 (0.06)	-0.04 (0.05)	0.02 (0.04)	0.04 (0.06)	-0.03 (0.06)
Episodic input	-0.28** (0.11)	-0.22 (0.13)	-0.33 (0.20)	-0.27* (0.11)	-0.25 (0.13)	-0.30 (0.22)
Pro × Episodic input	0.35* (0.15)	0.26 (0.20)	0.52* (0.26)	0.34* (0.15)	0.28 (0.19)	0.53 (0.28)
Thematic input	0.12 (0.17)	0.22 (0.20)	-0.14 (0.29)	0.12 (0.17)	0.25 (0.20)	-0.19 (0.31)
Pro × Thematic input	-0.10 (0.22)	-0.19 (0.27)	0.10 (0.37)	-0.09 (0.22)	-0.19 (0.27)	0.13 (0.39)
Sender's gender (1 = female)	0.01 (0.02)	0.02 (0.03)	0.00 (0.03)	0.01 (0.02)	0.03 (0.03)	0.00 (0.03)
Sender's age	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	-0.00* (0.00)
Sender's ideology	0.04 (0.04)	0.10 (0.06)	-0.01 (0.06)	0.05 (0.05)	0.08 (0.07)	0.01 (0.07)
Sender's education	0.01 (0.03)	0.04 (0.05)	0.00 (0.05)	-0.00 (0.03)	0.05 (0.05)	-0.02 (0.05)
Receiver's gender (1 = female)	-0.04* (0.02)	-0.05 (0.03)	-0.03 (0.03)	-0.02 (0.02)	-0.04 (0.03)	-0.01 (0.03)
Receiver's age	-0.00*** (0.00)	-0.00** (0.00)	-0.00 (0.00)	-0.00*** (0.00)	-0.00** (0.00)	-0.00 (0.00)
Receiver's ideology	0.70*** (0.04)	0.67*** (0.06)	0.72*** (0.06)	0.68*** (0.04)	0.68*** (0.06)	0.68*** (0.06)
Receiver's education	0.07* (0.03)	0.05 (0.04)	0.08 (0.05)	0.06 (0.03)	0.02 (0.04)	0.08 (0.05)
Receiver's need for affect				-0.02 (0.06)	0.08 (0.08)	-0.13 (0.09)
Receiver's need for cognition				0.06* (0.03)	0.07 (0.04)	0.05 (0.04)
Sender's policy opinion				-0.03 (0.03)	-0.00 (0.05)	-0.04 (0.05)
Sender's need for affect				-0.09 (0.06)	-0.12 (0.09)	-0.05 (0.08)
Sender's need for cognition				0.03 (0.03)	-0.00 (0.04)	0.06 (0.04)
Constant	0.23*** (0.06)	0.14 (0.09)	0.30*** (0.08)	0.26*** (0.08)	0.14 (0.11)	0.38*** (0.10)
n	897	444	453	863	444	419
adj. R^2	0.268	0.256	0.273	0.266	0.258	0.267

Note. Entries are unstandardized OLS regression coefficients with robust standard errors in parentheses. All variables range between 0 and 1 except for age, which was measured in years. *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

A6 Supplemental Study for Test 2

As argued in the main text in the second step of the communication flow, the loss of information and coherence from the original news story as well as the absence of trained journalistic communication should be expected to place heavier cognitive requirements on the ability of citizens to make inferences from the information they receive from fellow citizens.

To empirically validate the assumptions that the recollections produced in the second step of the communication flow were harder to process, less coherent, and less informative regarding the issue compared to the original news article, we implemented a supplemental survey to a nationally representative sample (n = 100) drawn to match the population on dimensions of gender, age (18–80 years), geography, and education. The survey was fielded to a new sample of respondents who had not previously taken part in the study. The survey was collected 7–8 June 2017.

A6.1 Research design and measures

The goal was to examine whether the original news stories were perceived as 1) better written and more coherent and 2) more informative with regards to the issue compared to the recollections that the respondents in Test 2 had read as input in transmission rounds 2 and 3. To this end, we randomly assigned each respondent to rate a) one of the original four news stories from round 1, b) one of the recollections that the respondents in Test 2 had read as input in transmission round 2, and c) one of the recollections that the respondents in Test 2 had read as input in transmission round 3.

To assess how well-written and coherent the news article and the recollections were, the respondents answered the following questions after reading each text: 'How much do you disagree or agree with the following statements?', 'The news article [recollection] was written in a coherent language', 'The news article [recollection] was written in a fluent language', 'The news article had a coherent structure', and 'The news article [recollection] was well-written'. Answers were measured

on a 7-point scale with endpoints labelled 'Completely disagree' and 'completely agree'. Answers were summed to three reliable indices ($\alpha_{\text{news article in transmission round 1}} = .90$, $\alpha_{\text{input recollection in transmission 2}} = .94$, $\alpha_{\text{input recollection in transmission 3}} = .95$), and coded to range from 0 to 1, higher values indicating more positive evaluations.

To assess how informative the news article and recollections were on the issue, the respondents answered the following items after each text: 'The news article [recollection] gave a clear picture of the background for and the consequences of the proposal', 'The news article [recollection] was relevant with regards to the proposal', 'The news article gave an informative picture of what the political proposal about cutting social welfare benefits was about', and 'Based on the news article [recollection], I find it impossible to make up my mind about the proposal to cut social welfare benefits' (reverse coded). The answers were measured on a 7-point scale with endpoints labelled 'Completely disagree' and 'completely agree'. The answers were then summed to three reliable indices ($\alpha_{\text{news article in transmission round 1}} = .80$, $\alpha_{\text{input recollection in transmission 2}} = .81$, $\alpha_{\text{input recollection in transmission 3}} = .85$), and coded to range from 0 to 1, higher values indicating that the news article [recollection] was perceived as more informative.

To obtain a final measure of the relative informativeness of the news article and the recollections, we asked the respondents to indicate how much they disagreed or agreed with the following statement: 'The recollection included less information than the news article'. Answers were measured on a 7-point scale with endpoints labelled 'Completely disagree' and 'Completely agree' and coded to range from 0–1, the higher values indicating that the recollections were evaluated to contain relatively less information than the news article. This item provides us with a secondary measure of the relative level of information in the news article and the recollections in addition to the scale described above.

A6.2 Results

To compare the ratings of the original news stories from round 1 of the transmission chain design with the recollections from rounds 2 and 3, respectively, we implemented paired samples t-tests. The results are reported in Tables A16–A18. As shown in Table A16, the respondents in the supplementary survey rated the news stories as significantly and substantially more coherent and well written than the recollections (mean differences .14 or higher, $p < 0.001$, Cohen's $d = 0.57$ or higher). Furthermore, as shown in Table A17, the respondents in the supplemental survey also rated the news story as much more informative than the recollections (mean differences = .15 or higher, Cohen's d = .63 or higher.

Finally, with respect to the final measure of the relative informativeness of the news article and the recollections, the results of the one-sample t-test (mean comparison test) reported in Table A18 support that the respondents agreed significantly that the recollections included less information than the news article (Mean = .70 on a scale ranging from 0–1, H_a mean > .5, $p < .001$, Cohen's d = 1.41 or higher).

In sum, the findings from the supplemental survey consistently support that the recollections were 1) less coherent and less well written and 2) less informative regarding the issue than the original news article. These findings empirically support the argument that the cognitive task of citizens is more difficult when they process information in the second step relative to the first step of the communication flow and, hence, that cognitive biases are potentially more influential when lay individuals transmit media frames in their social networks.

TABLE A16 Perceived cohesional quality of the news article and recollections

	Mean	Mean difference between news article and recollection	Cohen's *d* for the effect size of the mean difference
The news article in round 1	.65 (.02)	-	-
The input recollection in transmission round 2	.47 (.03)	.18 (.03)***	.71
The input recollection in transmission round 3	.50 (.03)	.14 (.04)***	.57

Note. The entries in columns 1–2 were calculated using paired samples t-tests. n = 80. $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

TABLE A17 Perceived informativeness of the news article and recollections

	Mean	Mean difference between news article and recollection	Cohen's *d* for the effect size of the mean difference
The news article in round 1	.60 (.03)	-	-
The input recollection in transmission round 2	.45 (.03)	.15 (.03)***	.63
The input recollection in transmission round 3	.41 (.03)	.18 (.04)***	.76

Note. The entries in columns 1–2 were calculated using paired samples t-tests. n = 79. $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

TABLE A18 Relative level of information in the news article compared to the recollections

	Mean	H_a mean > 0.5	Cohen's *d* for the effect size
The news article compared to the input recollection in transmission round 2	.70 (.03)	p < 0.001	1.48
The news article compared to the input recollection in transmission round 3	.70 (.03)	P < 0.001	1.41

Note. The entries in columns 1–2 were calculated using one-sample t-tests. n = 78. $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

A7 Supplemental Analyses for Test 3

A7.1 Tables 2–3, including coefficients for control variables

Table A19 reports the results from Table 2 in the main text, including the coefficients for the control variables that are not shown in Table 2 because of space limitations. In Table A19, we report unstandardized regression coefficients from OLS regressions as past research emphasize that such coefficients provide the best measure of effect size in regression analysis.[27] For all of the variables coded between 0–1 (i.e. all of the variables except age), the coefficient can be interpreted as the change in percentage points in correctly recollected information when the variable changes from its lowest to its highest value.

TABLE A19 Effect of sender's education on the amount of transmitted information

	Transmitted information from episodic frame (M1)	Transmitted information from thematic frame (M2)
Sender's education	0.00 (0.02)	0.05** (0.02)
Transmission 1	Ref.	Ref.
Transmission 2	-0.09*** (0.01)	-0.05*** (0.01)
Transmission 3	-0.15*** (0.01)	-0.09*** (0.01)
Sender's education × Transmission 1	Ref.	Ref.
Sender's education × Transmission 2	0.00 (0.03)	-0.04 (0.02)
Sender's education × Transmission 3	0.03 (0.03)	-0.03 (0.02)
Sender's gender (1 = female)	0.02** (0.01)	0.00 (0.01)
Sender's age	-0.00* (0.00)	-0.00 (0.00)
Sender's ideology	0.02 (0.02)	-0.00 (0.01)
Sender's need for affect	0.03 (0.02)	0.02 (0.02)
Sender's need for cognition	0.01 (0.01)	-0.00 (0.01)
Sender's policy opinion	0.00 (0.01)	0.01 (0.01)
Constant	0.22*** (0.02)	0.14*** (0.02)
N	1409	1409
adj. R^2	0.196	0.171

Note. Entries are unstandardized OLS regression coefficients with robust standard errors in parentheses. All variables range between 0 and 1 except for age, which was measured in years. *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

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[27] Achen 1982, pp. 76–7.

Table A20 reports the results from Table 3 in the main text including the coefficients for the control variables that are not shown in Table 3 due to space limitations. The entries in Table A20 are unstandardized OLS regression coefficients.

TABLE A20 Effect of sender's education on the impact of received episodic information on the impact of the issue frame on opinion

	Support for the proposal		
	Transmissions 2–3 (M1)	Transmission 2 (M2)	Transmission 3 (M3)
Pro frame	-0.00 (0.07)	0.03 (0.13)	0.00 (0.10)
Episodic input	-0.33 (0.25)	0.02 (0.33)	-0.66 (0.41)
Pro × episodic input	0.73* (0.35)	0.19 (0.48)	1.51** (0.54)
Sender's education	0.00 (0.01)	0.03 (0.02)	0.00 (0.02)
Pro × sender's education	0.01 (0.02)	0.01 (0.03)	-0.01 (0.03)
Episodic input × sender's education	0.01 (0.06)	-0.07 (0.08)	0.10 (0.14)
Episodic input × sender's education × pro	-0.09 (0.09)	0.02 (0.11)	-0.27 (0.17)
Thematic input	0.27 (0.38)	0.16 (0.48)	0.70 (0.64)
Pro × Thematic input	-0.47 (0.50)	0.13 (0.66)	-1.54 (0.81)
Thematic input × sender's education	-0.04 (0.10)	0.02 (0.11)	-0.29 (0.21)
Thematic input × sender's education × pro	0.08 (0.13)	-0.11 (0.16)	0.51* (0.24)
Receiver's gender (1 = female)	-0.02 (0.02)	-0.04 (0.03)	-0.01 (0.03)
Receiver's age	-0.00*** (0.00)	-0.00** (0.00)	-0.00 (0.00)
Receiver's ideology	0.68*** (0.04)	0.67*** (0.06)	0.68*** (0.06)
Receiver's education	0.06 (0.03)	0.03 (0.04)	0.07 (0.05)
Receiver's need for affect	-0.02 (0.06)	0.07 (0.08)	-0.15 (0.09)
Receiver's need for cognition	0.06* (0.03)	0.06 (0.04)	0.05 (0.04)
Sender's policy opinion	-0.03 (0.03)	-0.01 (0.05)	-0.04 (0.05)
Sender's gender (1 = female)	0.02 (0.02)	0.03 (0.03)	-0.00 (0.03)
Sender's age	-0.00 (0.00)	0.00 (0.00)	-0.00* (0.00)
Sender's ideology	0.05 (0.05)	0.08 (0.07)	0.01 (0.07)
Sender's need for affect	-0.09 (0.06)	-0.10 (0.09)	-0.04 (0.08)
Sender's need for cognition	0.03 (0.03)	-0.01 (0.04)	0.06 (0.04)
Constant	0.24** (0.08)	0.06 (0.13)	0.36** (0.11)
n	863	444	419
adj. R^2	0.263	0.251	0.273

Note. Entries are unstandardized OLS regression coefficients with robust standard errors in parentheses. All variables range between 0 and 1 except for age, which was measured in years. $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

A7.2 Analysis of robustness for Tables 2–3 using stemmed dictionaries

To investigate the robustness of the findings reported in Table 2 in the main text, Table A21 repeats the analyses reported in Table 2 in the main text and in Table A19 in the Online Appendix using the stemmed dictionaries in the automatic content analysis. Table A21 reports unstandardized regression coefficients from OLS regressions, as past research has emphasized that such coefficients provide the best measure of effect size in regression analysis.[28] For all of the variables coded between 0–1 (i.e. all variables except age), the coefficient can be interpreted as the change in percentage points in correctly recollected information when the variable changes from its lowest to its highest value.

To investigate the robustness of the findings reported in Table 3 in the main text, Table A22 repeats the analyses reported in Table 3 in the Table A20 using the stemmed dictionaries in the automatic content analysis. Entries in Table A22 are unstandardized OLS regression coefficients.

The results in Tables A21–22 replicate the findings reported in Tables 2–3 in the main text and in Tables A19–20 in the Online Appendix. This supports the robustness of the empirical support for H3 that the capacity of citizens to recollect episodic frames persuasively is independent of their political sophistication.

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[28] Achen 1982, pp. 76–7.

TABLE A21 Effect of sender's education on the amount of transmitted information (with stemmed dictionaries)

	Transmitted information from episodic frame (M1)	Transmitted information from thematic frame (M2)
Sender's education	0.01 (0.02)	0.06** (0.02)
Transmission 1	Ref.	Ref.
Transmission 2	-0.09*** (0.02)	-0.06*** (0.01)
Transmission 3	-0.16*** (0.01)	-0.10*** (0.01)
Sender's education × Transmission 1	Ref.	Ref.
Sender's education × Transmission 2	-0.01 (0.03)	-0.04 (0.02)
Sender's education × Transmission 3	0.03 (0.03)	-0.03 (0.02)
Sender's gender (1 = female)	0.02** (0.01)	0.01 (0.01)
Sender's age	-0.00 (0.00)	-0.00 (0.00)
Sender's ideology	0.02 (0.02)	0.00 (0.01)
Sender's need for affect	0.04 (0.02)	0.02 (0.02)
Sender's need for cognition	0.01 (0.01)	-0.01 (0.01)
Sender's policy opinion	0.01 (0.01)	0.01 (0.01)
Constant	0.24*** (0.02)	0.17*** (0.02)
n	1409	1409
adj. R^2	0.195	0.192

Note. Entries are unstandardized OLS regression coefficients with robust standard errors in parentheses. All variables range between 0 and 1 except for age, which was measured in years. $^*p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

TABLE A22 Effect of sender's education on the impact of received episodic information on the impact of the issue frame on opinion (with stemmed dictionaries)

	Support for the proposal		
	Transmissions 2–3 (M1)	Transmission 2 (M2)	Transmission 3 (M3)
Pro frame	-0.00 (0.08)	0.05 (0.14)	-0.02 (0.10)
Episodic input	-0.28 (0.23)	0.16 (0.31)	-0.81* (0.39)
Pro × episodic input	0.57 (0.32)	0.06 (0.45)	1.38** (0.50)
Sender's education	0.00 (0.01)	0.03 (0.02)	0.00 (0.02)
Pro × sender's education	0.00 (0.02)	-0.00 (0.03)	-0.00 (0.03)
Episodic input × sender's education	-0.00 (0.06)	-0.10 (0.07)	0.15 (0.13)
Episodic input × sender's education × pro	-0.06 (0.08)	0.05 (0.11)	-0.26 (0.15)
Thematic input	0.22 (0.32)	0.03 (0.42)	0.83 (0.52)
Pro × Thematic input	-0.29 (0.45)	0.17 (0.59)	-1.31 (0.69)
Thematic input × sender's education	-0.03 (0.08)	0.04 (0.10)	-0.31 (0.17)
Thematic input × sender's education × pro	0.06 (0.11)	-0.08 (0.15)	0.43* (0.21)
Receiver's gender (1 = female)	-0.02 (0.02)	-0.04 (0.03)	-0.01 (0.03)
Receiver's age	-0.00*** (0.00)	-0.00** (0.00)	-0.00 (0.00)
Receiver's ideology	0.68*** (0.04)	0.67*** (0.06)	0.68*** (0.06)
Receiver's education	0.06 (0.03)	0.03 (0.04)	0.08 (0.05)
Receiver's need for affect	-0.02 (0.06)	0.08 (0.08)	-0.14 (0.09)
Receiver's need for cognition	0.06* (0.03)	0.07 (0.04)	0.05 (0.04)
Sender's policy opinion	-0.03 (0.04)	-0.00 (0.05)	-0.05 (0.05)
Sender's gender (1 = female)	0.02 (0.02)	0.03 (0.03)	0.00 (0.03)
Sender's age	-0.00 (0.00)	0.00 (0.00)	-0.00* (0.00)
Sender's ideology	0.05 (0.05)	0.08 (0.07)	0.02 (0.07)
Sender's need for affect	-0.09 (0.06)	-0.11 (0.09)	-0.06 (0.08)
Sender's need for cognition	0.03 (0.03)	-0.00 (0.04)	0.06 (0.04)
Constant	0.24** (0.08)	0.03 (0.14)	0.37** (0.11)
n	863	444	419
adj. R^2	0.263	0.254	0.270

Note. Entries are unstandardized OLS regression coefficients with robust standard errors in parentheses. All variables range between 0 and 1 except for age, which was measured in years. $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

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