

## **SHORT REPORT ON INITIAL POLARIZATION/ARGUMENT VISUALIZATION STUDY**

**Simon Cullen and Vidushi Sharma**

**Background** Partisan antipathy is rife among both Democrats and Republicans, with over half of the members of each party reporting “very unfavorable” opinions of the other (PEW, 2017). Today, more than half of conservatives and liberals prefer to live in like-minded communities and say that most of their close friends share their views. Communicating political arguments using prose may contribute to this damaging political polarization. Because people tend to be bad at extracting arguments from prose, prose-based media may increase people’s reliance on “interpretive heuristics”—rules of thumb that are highly susceptible to biases.

Like playing mental chess, comprehending even a moderately complex prose-based argument places unrealistic demands on our limited cognitive resources (e.g., working memory). So, instead of reasoning about the argument as stated, most people reason about their own overly simplified representations -- summaries of the author’s argument created on the fly. The cognitive processes responsible for creating these simplified argument representations are likely to be especially susceptible to relatively automatic and effort-minimizing heuristics and biases, such as confirmation bias. If true, this would provide a powerful explanation for why it is so difficult to evaluate counterevidence fairly.

**Hypothesis** Substantially decreasing the cognitive burden associated with argument comprehension will reduce people's reliance on interpretive heuristics and will thereby reduce their susceptibility to confirmation bias.

**Stimuli** See Figs. 1 and 2, on the next page. We selected the polarizing topic of whether the US should construct a wall along its southern border. We selected this topic as our previous studies had revealed that mTurkers are predominantly liberal-leaning, and we wished to focus on people’s reactions to arguments for conclusions they are strongly inclined to reject.

We matched the argumentative content across the conditions; the only difference is that the visualization condition used hierarchical grouping cues (color, line, and shape) to communicate the argument’s logical structure. Participants in the visualization condition should rely less on interpretative heuristics, because they face a less cognitively demanding task. Thus, they should be less susceptible to confirmation bias, less overwhelmed by strong emotional reactions to the stimuli, and less hostile towards people who endorse the argument’s conclusion.

**Procedure** We ran our pilot study with North American mTurk participants. Our survey instrument is available to view in [demonstration mode here](#).

- First, we measured their degree of prior polarization using a scale we developed partly based on materials from Pew’s [polarization survey](#). The scale included the following items:

Please indicate your agreement or disagreement with the following statements:

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I am happy to count Conservatives among my friends	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would be happy if my child married a Conservative	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would NOT be happy to live in a Conservative neighborhood	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Select 'agree' for this item	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Conservatives are a threat to the nation's well-being	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Conservatives disgust me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

(Note that the live scale asked liberal participants about their feelings towards conservatives, and conservative participants about their feelings towards liberals.)

- We administered versions of the Cognitive Reflection Task ([CRT2](#)) and Mellers' Actively Open-minded Thinking scale ([AOT](#)).
- We then had participants rate the following questions (counterbalanced for order) on 7-point scales:
  - 1. How much do you support or oppose building a wall along the United States' southern border with Mexico?
  - 2. How morally bad are people who support [oppose] the southern border wall?
  - 3. How confident are you in your views on the southern border wall?
  - 4. How happy do you feel about the idea of the southern border wall?

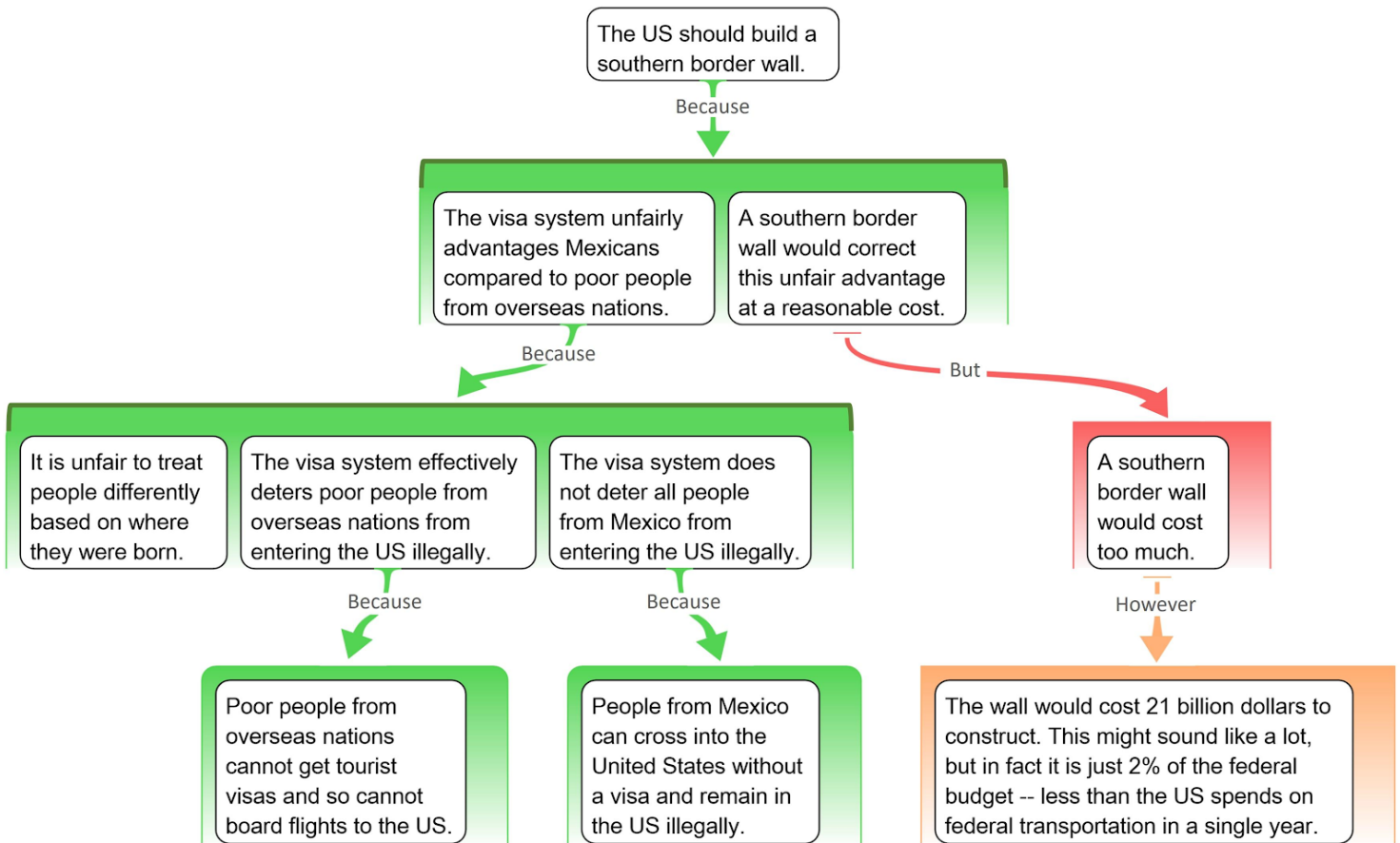
Fig. 1: Prose condition stimulus:<sup>1</sup>

The US should build a southern border wall because the visa system unfairly advantages Mexicans compared to poor people from overseas nations. A southern border wall would correct this unfair advantage at a reasonable cost.

It is unfair to treat people differently based on where they were born, but the visa system deters poor people from overseas nations from entering the US illegally while not deterring all people from Mexico from entering the US illegally. This is because, while people from Mexico can cross into the United States without a visa and remain in the US illegally, poor people from overseas nations cannot get tourist visas and so cannot board flights to the US.

One objection is that a southern border wall would cost too much. However, a wall would cost 21 billion dollars to construct. This might sound like a lot, but in fact it is just 2% of the federal budget --less than the US spends on federal transportation in a single year.

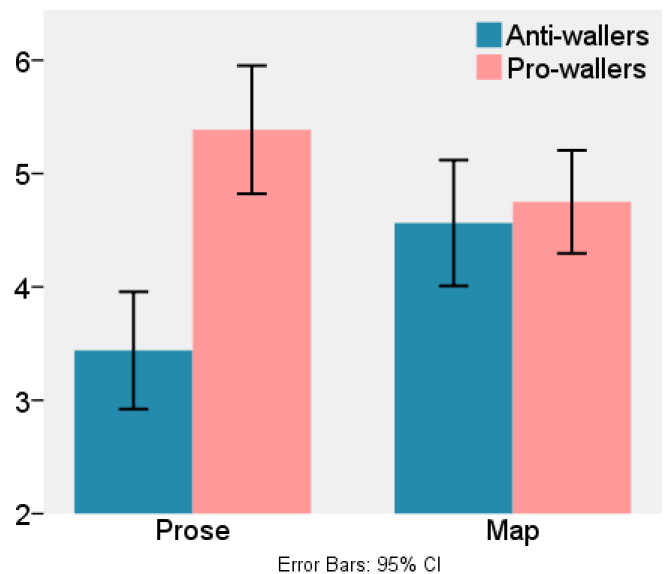
Fig. 2: Visualization/Map Condition stimulus:



- Participants were then randomized into either the Map or Prose conditions. In each condition, participants were asked to consider the argument carefully as a comprehension quiz would be used to determine bonus pay.
- *Measurement of DVs.* After participants read the argument and answered comprehension questions, we explained that we were "interested in whether the argument you have just read has affected your views on the topic discussed above." Participants then rated items (1) - (4) again (also counterbalanced for order).

**Results** We tested our hypothesis by regressing our IVs -- condition (map vs. prose), CRT (high vs. low), polarization (high vs. low), and their products --

Figure 3: Participants' responses to the question "How intelligent was the argument you just read?"



against each of the posttest measures of (1) - (4), and against the deltas of each measure (i.e., posttest - pretest).

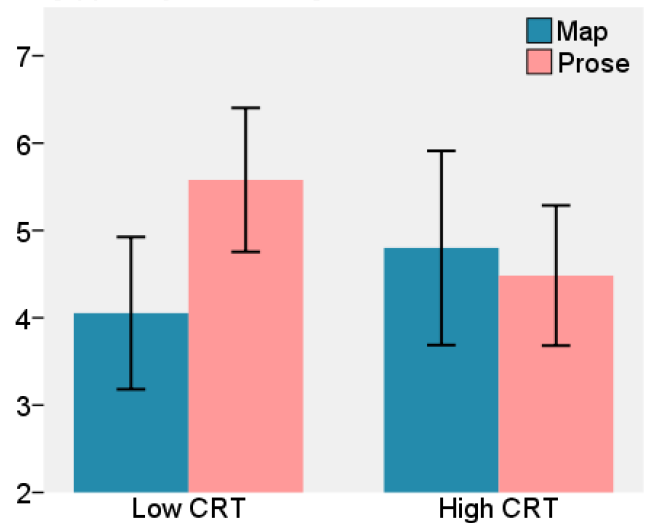
- Unsurprisingly, in the Prose condition, participants' prior attitudes towards a southern border wall strongly predicted their judgements of the argument's intelligence: anti-wallers saw the pro-wall argument as less intelligent than did pro-wallers. However, much more surprisingly, this was not true in the Visual Map condition (Fig. 3). (For the interaction of condition and attitude to towards a border wall,  $F(1, 184) = 11.5$ ,  $p = .001$ ,  $\eta_p^2 = .06$ .) The difference between anti-wallers' assessments in the Prose and Visual Map conditions was large, Cohen's  $d = 0.63$ , 95% CI: [0.20, 1.1].
- Disaggregating by CRT, we found an interaction effect (Condition x CRT) on intelligence ratings such that low-CRT pro-wallers in the Prose condition appear to be especially susceptible to confirmation bias:  $F(1, 95) = 7.36$ ,  $p = 0.008$ ,  $\eta_p^2 = 0.074$ .
- More surprisingly, low-CRT anti-wallers in the Visual Map condition saw their opponents (i.e., pro-wallers) as less morally evil than did low-CRT anti-wallers in the Prose condition,  $F(1, 95) = 4.96$ ,  $p = 0.03$ ,  $d = 0.87$  (95% CI: [0.20, 1.53]), but this effect did not emerge among high-CRT participants (Fig. 4).

We suspect this may be because high-CRT participants' tendency to question their intuitive reactions protects them from confirmation bias.

We also found that anti-wallers became:

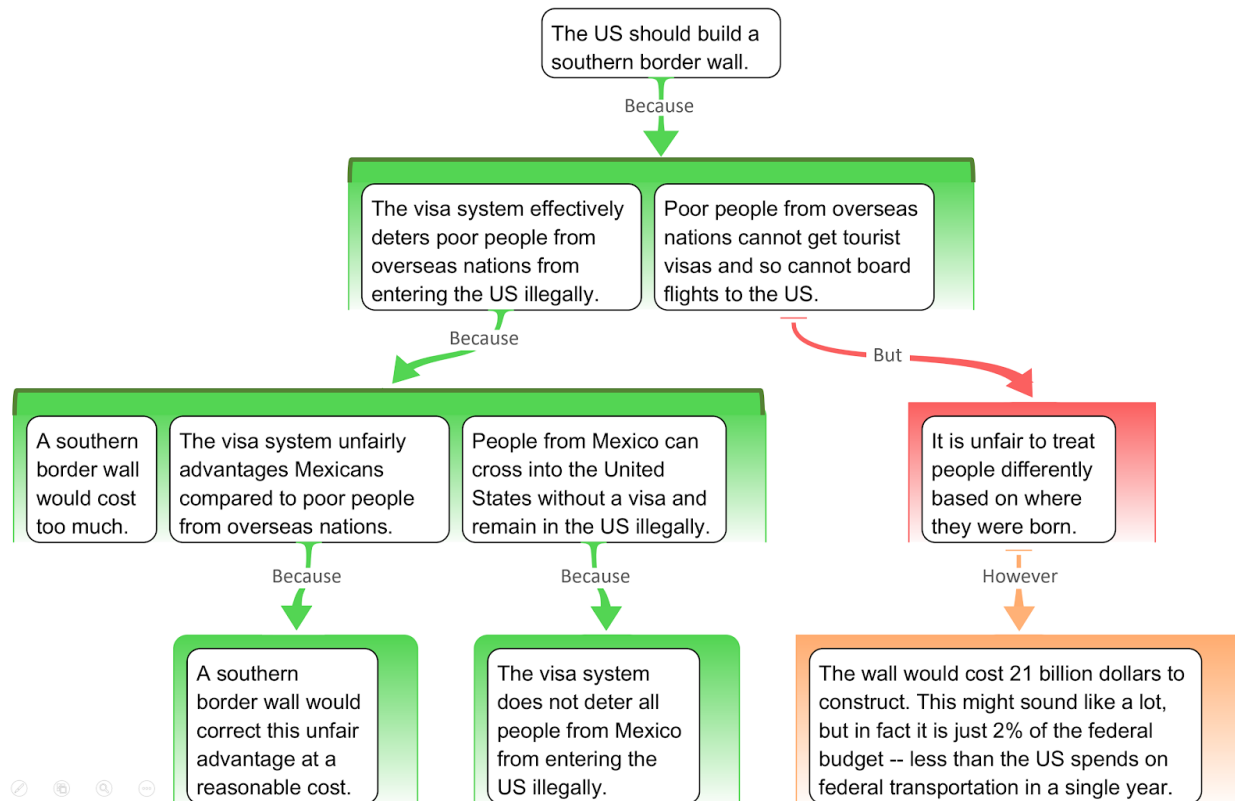
- happier about the prospect of a border wall after reading the visualization,  $M_{change} = 0.21$  (95% CI: [-0.04, 0.45]), but slightly less happy about it after reading the prose,  $M_{change} = -0.12$ ,  $d = -0.58$  (95% CI: [-1.00, -0.15]), and
- more supportive of a border wall after reading the visualization,  $M_{change} = 0.28$  (95% CI: [0.05, 0.52]), than after reading the prose,  $M_{change} = 0.06$  (95% CI: [-0.03, 0.15]),  $d = -0.42$  (95% CI: [-0.84, 0.00]).

Figure 4: Anti-wall participants' responses to the question "How morally bad are people who [oppose your view on] a southern border wall?"



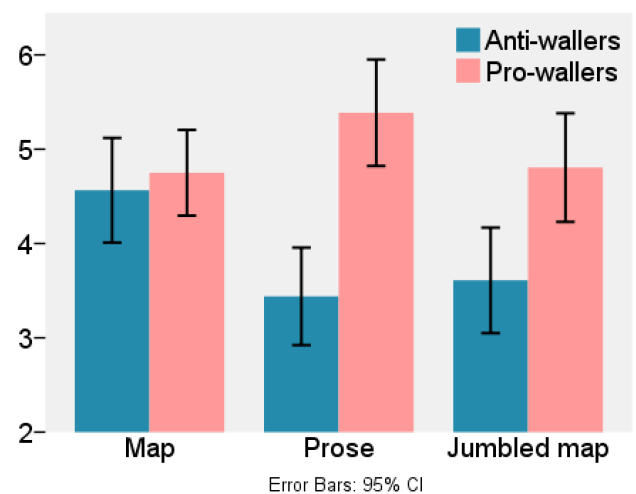
**Jumbled Map Condition** Does the visual design of an argument map simply seem “smart” to participants, regardless of its content? To test the hypothesis that the results found in the Map condition actually reflected participants' greater appreciation of the argument's structure, we created a jumbled version of the stimulus. By moving the claims in the original map around without regard to their logical relations, we created a diagram that did not contain any argument but looked similar to the Map condition (Fig. 5). We tested this stimulus using the same method as in previous conditions.

Figure 5. Jumbled Map Condition stimulus:



**Results** Just as in the Prose condition, participants in the Jumbled Map condition displayed a strong effect of confirmation bias: anti-wallers rated the argument as substantially less intelligent ( $M = 3.6$ ) than did pro-wallers ( $M = 4.8$ ). This difference was statistically significant,  $t(85) = 3.0, p = .004$ , and large,  $d = 0.64$  (95% CI: [0.21, 1.1]). Surprisingly, the Prose and Jumbled Map conditions did *not* differ significantly,  $F(1, 180) = 0.13, p > .5$ , indicating that the difference between the Map and Prose conditions reflected more than participants' simply being impressed by the visual presentation of the diagram. In fact, the Jumbled Map and Prose conditions did not differ significantly on any dependent variable ( $ps > .35$ ).

"How intelligent was the argument you just read?"



**Plans for future work** We plan first to replicate our results using a variety of stimuli. Second, we hope to test our hypothesis that argument maps reduce polarization by decreasing people's reliance on bias-prone interpretive heuristics. In these experiments, we plan to manipulate participants' cognitive load. If our hypothesis is correct, increasing cognitive load should reduce or eliminate the difference between conditions.

If our behavioral studies are successful, we hope to run an imaging study to investigate the neural mechanisms underlying the depolarizing effects of argument visualization. We plan to take [Kaplan, Gimbel & Harris's](#) (2016) study as our template. Kaplan et al. found that participants who changed their minds more in response to counterattitudinal political arguments showed lower BOLD signal in the insula and the amygdala. We hypothesize that participants presented with argument visualizations will show similar patterns of brain activation, indicating less emotional arousal from the argumentative content. We also hope to test this hypothesis by measuring participants' galvanic skin resistance as they read counterattitudinal political arguments presented in both prose and map forms.

We hope that this work will eventually inform the design of media that improve public rationality, reduce political polarization, and more effectively communicate political and moral argument.