

2022

## The Relationship Between Motivated Reasoning and Reading Mode on Performance

Anne M. Niccoli  
*U.S. Coast Guard*, [anne.m.niccoli@uscg.mil](mailto:anne.m.niccoli@uscg.mil)

Follow this and additional works at: <https://opencommons.uconn.edu/nera-2022>

---

### Recommended Citation

Niccoli, Anne M., "The Relationship Between Motivated Reasoning and Reading Mode on Performance" (2022). *NERA Conference Proceedings 2022*. 4.  
<https://opencommons.uconn.edu/nera-2022/4>

**The Relationship Between Motivated Reasoning and Reading Mode on Performance**

Anne Niccoli

U.S. Coast Guard Leadership Development Center

Author Note

Paper submitted to Northeastern Educational Research Association (NERA)  
NERA Conference, October 2022.

Sincere appreciation to the volunteer participants of Boat Forces Command Cadre  
School, Midgrade Officers Career Transition Course, and Senior Enlisted Leadership Course  
students at the U. S. Coast Guard Leadership Development Center.

Correspondence concerning this article should be addressed to Anne M. Niccoli,  
U.S. Coast Guard, Leadership Development Center. Contact: [anne.m.niccoli@uscg.mil](mailto:anne.m.niccoli@uscg.mil)

**ABSTRACT**

This study sought to determine if there are differences in cognitive performance based on reading mode, political affiliation, and motivated reasoning. Military students interpreted equivalent data for neutral and political policy topics between paper and digital tablets modes. Differences in performance were examined by comparing results between and within reading modes. Chi test results for data interpretation accuracy showed significant differences between reading modes ( $p < .01$ ) and a medium effect size ( $\nu = 0.38$ ). This study extends current research by comparing student performance across reading modes in relation to motivated reasoning.

*Keywords:* motivated reasoning, cognitive biases, critical thinking, identity protection, political opinion

## MOTIVATED REASONING

### **The Relationship Between Motivated Reasoning and Reading Mode on Performance**

The proliferation of misinformation disseminated by social media is driven more by popularity than accuracy (Nolan, 2017). Misinformation fuels motivated reasoning and cognitive biases that affect multiple cognitive and emotional processes.

Motivated reasoning is the evaluation of information to protect individual or group values rather than objectively assessing facts (Kunda, 1990). Individuals justify beliefs to preserve group identification based on ideological values, partisanship, and affective divisions (Jost et al., 2022). According to Pew (2019), political polarization is the biggest factor involving public attitudes and values such as immigration and climate change, with the largest gaps for gun policy (57%) and race (55%).

Carpenter & Alloway (2019) compared computer-based testing with paper involving working memory that showed a negative performance for computer-based tests. Studies showed that digital technology affects cognitive processing and learning (Loh & Kanai, 2016; Rosenwald, 2014; Umejima et al., 2021) and digital users develop new cognitive shortcuts (Lui, 2005).

Together, misinformation, polarization, and social media create a fertile environment for activating cognitive biases and motivated reasoning.

### **Statement of the Problem**

Motivated reasoning inhibits the objective evaluation of information and decisions, which is often disassociated with accuracy (Kahan, 2013). There is a scarcity in understanding the influence of motivated reasoning related to data interpretation while using digital devices. The influence of social media and online communities involving political polarization challenges

## MOTIVATED REASONING

educators and scientists to effectively counter motivated reasoning because democracies depend upon citizens to interpret data and make sound judgment about policies, even while under the influence of biases (Lazer et al., 2018; Strömbäck, 2021).

### **Theoretical Framework**

The theoretical framework for this study relates to **cognitive information processing, specifically motivated reasoning**. Motivated reasoning considers cognitive and affective factors that influence decision making. Political issues often involve ideological cognitive biases and associated affective qualities that reinforce self-identity and political affiliation (Bolsen, et al., 2014). Furthermore, partisan endorsements also have powerful influences on individuals to maintain dispositions and consequently influence opinions (Bolsen et al., 2014; Kahan et al., 2017; Slothuus & de Vreese, 2010). Because ideological positions are associated with cognitive biases, it is important to understand the influence on critical thinking, evaluation of policies, and effects on decision making.

### **Significance of the Study**

The increase use of digital devices presents new questions related to critical thinking and effective instructional interventions. This experimental design extends studies involving motivated reasoning to further explore motivated reasoning in relation to digital devices.

Social media induces a conditioning of mental processing (i.e., reward and avoidance) through release of hormones (i.e., dopamine), creating reinforcing feedback loops (Haynes, 2018). Because mental conditioning may be associated with political dispositions and affiliations (Weston et al., 2006), it is important to consider motivated reasoning in relation to digital

## MOTIVATED REASONING

environments to better understand the influence on critical thinking. The National Educational Association considers affective polarization, fueled by misinformation and disseminated via social media, a threat to our democratic values (Walker, 2021).

### **Literature Review**

Motivated reasoning refers to biased cognitive processing in the ways individuals assess, construct, and evaluate information to conform to a particular goal or belief that may be disassociated with accuracy or disregard facts that conflict with existing beliefs (Druckman & Bolsen, 2011; Kunda, 1990). Motivated reasoning usually involves confirmation bias, a cognitive process that filters out conflicting information and reinforces prior beliefs, and self-serving bias, a process that protects identity and lessens cognitive dissonance or discomfort from information that conflicts with pre-existing beliefs.

Humans prefer to simplify complex issues and cognitive biases function as a heuristic or shortcut that reduces cognitive effort. Kahneman (2011) characterized System 1 as an automatic process that requires less effort, whereas System 2 is deliberate and rational, thereby expending greater effort. Motivated reasoning relates to System 1 or fast, automatic thinking that engages heuristics and biases rather than System 2, characterized by slow, reflective thinking.

### **Group Polarization**

Political polarization about scientific and empirical issues persists despite scientific consensus opposing opposite positions and values (Kahan, 2013). Group polarization refers to a change in individual preferences to conform to group preferences, usually following a discussion. Social media provides a means for ongoing discussions that influence individuals through group rules, social comparisons, and information sharing (Meyers & Lamm, 1976).

## MOTIVATED REASONING

Group membership influences brain activities through processing information in cognitive and emotional systems. Brain activity for members of the ingroup showed lower empathy for outgroup members but higher sensitivity for perceived threats by outgroup members (Molenberghs & Louis, 2018). Studies using Magnetic Resonance Imaging (fMRI) highlight the nexus of brain activity with group dynamics, cognitive processing, and emotional systems.

Republicans showed greater brain activity in the right amygdala whereas the Democrats showed greater activity in the left insula indicating an association between brain activity with partisanship (Schreiber et al., 2013). Moreover, the results suggest distinct differences in the neural processes when evaluating values, not simply a difference in values. Consequently, motivated reasoning may condition brain processes by triggering cognitive biases and evaluation processes.

Experimental results by Wischniewski et al. (2021) support the role of cognitive sophistication as a mitigating factor of influence by misinformation. Furthermore, the findings showed emotional processes only partially related to political identity, nevertheless, emotions predicted performance more consistently than political identity and cognitive sophistication.

### **Identity Protection**

Researchers report a continuing rise of ideological attitudes across Independents, Democrats, and Republicans (Pew Research, 2019, 2014; Smith, 2016). Identity-protection Cognition Thesis (ICT) takes into account the psychological investment with affinity groups and shared beliefs (Kahan et al., 2017). Political issues trigger both cognitive and affective reactions, which may impede or enhance reflective and deliberate cognitive reasoning. That is, individuals interpret evidence to align with the value system of the group or affiliation.

## MOTIVATED REASONING

Studies conducted by Bolsen et al. (2014) provide evidence of motivated reasoning related to party endorsements. Individuals are more supportive of policies endorsed by in-group partisan elites but significantly less supportive of the same policy when endorsed by the out-group (see also, Druckman, 2012; Druckman et al., 2013) lending support for the Identity-protection Cognition Thesis put forth by Kahan et al. (2017).

The current political polarization related to guns and schools presents an opportunity to investigate cognitive processes, motivated reasoning, and polarization involving gun policies (Parker et al., 2017). An Internet search of the term “school and guns” yielded 539,000,000 results that underscores interest and relevancy for educators (Oct 2022).

### **Digital Devices**

A study by Umejima et al. (2021) showed differences in cognitive processes related to memory and retrieval between note paper and mobile device users. Brain activations for the paper group were deeper and localized in different areas compared to device users. A meta-analysis of studies that compared paper with screen reading highlights a negative performance for screen reading compared to paper (Clinton, 2019).

The convergence of personal values or ideology, group polarization, and digital environments present challenges related to cognitive biases and performance. Because students are socially active and leveraging social media to influence social policies, it is relevant and imperative that educators equip students with the necessary skills to communicate and interpret empirical and scientific information (Nolan, 2017). More to the point, given the current state of political polarization, educators need new approaches to uncover the nexus between ideology, political issues, digital media, and critical thinking.



## MOTIVATED REASONING

### Methodology

The primary goal for this study is to investigate the effects of political issues and reading mode on data interpretation (accuracy and motivated reasoning).

### Sample Participants and Procedure

The sample for this study were from the U.S. Coast Guard, a military branch whose primary missions involve maritime safety and security ( $N = 47$ ). Existing class groups of adult military leadership students with approximately 10 years of service were randomly assigned to read either paper or tablet prompts and interpret a data table accurately. The researcher distributed the prompts for the Paper and Tablet groups while in classrooms (Appendix A).

Students reported their political leaning to test for possible associations with responses to the prompts. However, the small sample size and distribution was limited for statistical computation for political association as shown in Table 1.

**Table 1**

<i>Political Party</i>	<i>(N = 47)</i>		
	<b>Neutral</b>	<b>Democrat</b>	<b>Republican</b>
<b>Paper</b>	4	7	14
<b>Tablet</b>	4	2	16

For both the Paper and Tablet conditions, students recorded their responses on a separate paper (Appendix B).

The following hypotheses were tested to determine the effects in cognitive performance based on reading mode and political affiliation.

**H<sub>1</sub>:** *Military students presented with a data interpretation prompt will show significant differences in increased accuracy for paper mode compared to tablet condition.*

## MOTIVATED REASONING

**H<sub>2</sub>:** *Military students presented with a paper prompt of will show significantly less influence of motivated reasoning of data interpretation compared to tablet condition.*

**H<sub>3</sub>:** *Military students will show motivated reasoning of data interpretation based on political affiliation.*

### **Design: Quasi-Experimental**

Convenience groups of military students were randomly assigned to read paper or digital tablet prompts requiring data interpretation ( $N = 47$ ). Each condition includes the same prompt comprising two topics to interpret narrative and text data regarding the effectiveness of a rash ointment and concealed gun policy (Appendix A).

Students were presented with statistics for the rash ointment for the first prompt to avoid triggering motivated reasoning or other biases. The second topic, concealed guns, presented comparable data to determine if interpretation was influenced by politically motivated reasoning. Students recorded responses on paper for Paper and Tablet conditions (Appendix B).

### **Variables**

The design for this study examined data interpretation results for the gun ban prompt for accuracy and motivated reasoning in relation to two reading mode conditions. Data was collected ( $N = 47$ ) to determine associations between reading mode, accuracy, and motivated reasoning. The design allowed for comparisons within and between groups: two levels for reading mode condition (Paper, Tablet) in relation to accuracy and motivated reasoning (see Table 2).

MOTIVATED REASONING

**Table 2**

*Modes* (N = 47)

Mode	Correct	Incorrect
<b>Paper (n=25)</b>		
<b>Tablet (n=22)</b>		

**Results**

This study sought to determine if there are differences in cognitive performance based on reading mode and motivated reasoning. Chi test statistics were computed to determine significant differences between groups and Cramer’s  $v$  for the magnitude of the effect size. The following hypotheses were tested:

**H<sub>1</sub>:** *Military students presented with a data interpretation prompt will show significant differences in increased accuracy for paper mode compared to tablet condition.*

**H<sub>2</sub>:** *Military students presented with a paper prompt of will show significantly less influence of motivated reasoning of data interpretation compared to tablet condition.*

**H<sub>3</sub>:** *Military students will show motivated reasoning of data interpretation based on political affiliation.*

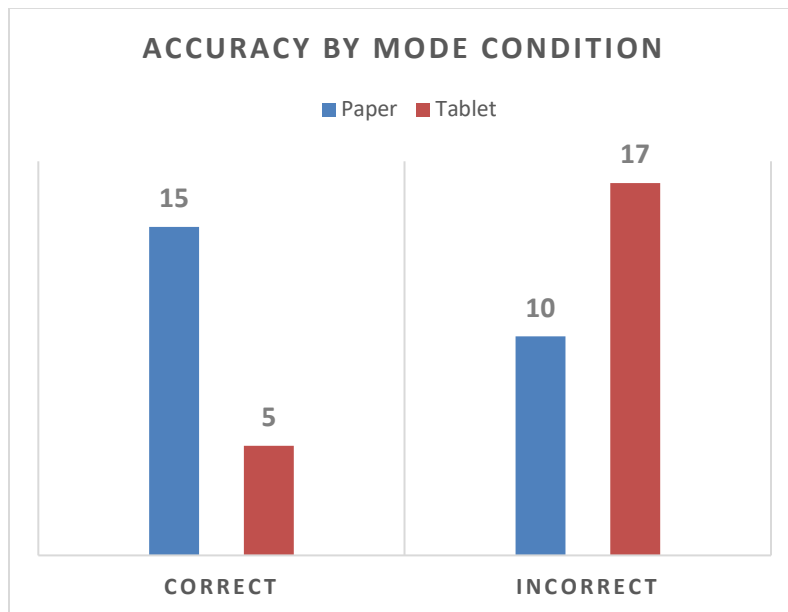
Accurate responses by reading modes are displayed in Table 3 and Figure 1.

**Table 3**

*Responses by Mode Condition* (N = 47)

	Correct	Incorrect
<b>Paper (n=25)</b>	15	10
<b>Tablet (n=22)</b>	5	17

## MOTIVATED REASONING

**Figure 1***Correct Responses by Mode* (N = 47)

A chi-test was computed to determine significant differences for accuracy:

**H<sub>1</sub>:** *Military students presented with a data interpretation prompt will show significant differences in increased accuracy for paper mode compared to tablet condition.* Chi-square test results show a significant difference in accuracy between Paper and Tablet modes ( $p < .01$ ),  $X^2(1, N = 47) = 6.5504, p = .009913$  with a medium effect size ( $\nu = 0.38$ ), supporting H<sub>1</sub>, which expected higher accuracy for paper.

A comparison of changes in responses within modes and between modes was tested: **H<sub>2</sub>:** *Military students presented with a paper prompt of will show significantly less influence of motivated reasoning of data interpretation compared to tablet condition.* Although the first prompt was neutral and the second emotional, the calculations for both prompts yield the same result. The prompts sought to investigate the influence of motivated reasoning by change in responses.

## MOTIVATED REASONING

The results for the first and second prompts were examined for changes in accuracy between the rash and the gun prompt (emotional). The gun prompt, which is emotional, relates to identity protection and motivated reasoning. Comparisons within and between modes sought to identify differences for changes in accuracy between rash and gun prompt responses as an indicator of motivated reasoning. Chi-square test results did not show a significant difference with changing responses between Paper and Tablet mode conditions. However, Tablets showed higher frequency of change in responses (41%) compared to Paper (32%).

The third hypothesis examined the influence of political affiliation:

**H<sub>3</sub>:** *Military students will show motivated reasoning of data interpretation based on political affiliation.*

The sample distribution related to political orientation was skewed towards Republican with insufficient data for Democrats and Neutral to determine a significant association between political party and motivated reasoning (change in accuracy between rash and gun prompts). Nevertheless, the distribution of percentage changes in accuracy suggests a pattern of motivated reasoning across each affiliation (Table 4).

**Table 4**

*Motivated Change by Affiliation* (N = 47)

<b>Affiliation</b>	<b>Change</b>
Democrats (n=9)	28%
Republicans (n=30)	36%
Neutral (n=8)	50%

*Note:* Change refers to change in accuracy between prompts

## MOTIVATED REASONING

### **Conclusion**

The results from this study indicate differences in computational performance between digital devices and paper when presented with an emotional prompt. There was a significant difference in accuracy between Paper and Tablet participants. As expected, those with Paper prompts had a higher rate of accuracy (60%) vs. Tablet participants (23%). Although there was no statistical difference in motivated reasoning based on mode as measured by changes in responses between the rash and gun prompts, nevertheless, Tablet users changed their responses more frequently compared to Paper users (41% vs 32%). Given the various uses and types of digital devices, there is a lack of understanding of the effects on performance and decisions.

Despite the skewed distribution by political affiliation, there was no statistical difference between parties for motivated reasoning, even though each affiliation showed change in accuracies between the rash and gun prompts. Taken together, the average change for the sample was 38%, suggesting motivated reasoning based on prompts.

### **Discussion**

This study sought to examine the nexus of cognitive biases with digital and non-digital conditions. Students were presented with two computational prompts that yield the same result. The first prompt was neutral (rash treatment) and the second associated with ideological positions (concealed gun bans).

As expected, Paper showed the highest rates for accuracy compared to Tablet condition. Based on previous studies, researchers hypothesized that paper readers may reflect differently compared to digital users who tend to rely more on fast thinking heuristics (Liu, 2005; Mangen et al., 2013).

## MOTIVATED REASONING

Hypothesis two investigated the possible association of motivated reasoning of responses for the concealed gun ban prompt based on mode. Motivated reasoning was determined when accurate responses were given to the rash prompt and a change in response to the gun ban prompt. The results did not support a significant difference for motivated reasoning between Paper and Tablet in support of H<sub>2</sub>, suggesting consistency in effect for motivated reasoning.

It was expected that the Paper condition would yield higher rates of accuracy compared to Tablet, and that the Paper group would show lower rates for motivated reasoning. The Tablet condition showed the lowest rates for accuracy and the highest rates for motivated reasoning (41%) as indicated by change for responses. It is possible that the lower rates of accuracy and higher rates for motivated reasoning for the Tablet group was in part due to the difference in reading behaviors required for Tablets. For the Paper group, the two prompts were presented on a single, two-sided paper, but for the Tablet group, students had to “swipe” the page to view the second prompt (Appendix A). Nevertheless, for both Paper and Tablet conditions, students recorded responses on paper.

The differences in frequencies results mirror previous research that showed significant differences in responses between one and two-page formats with Tablet groups (Niccoli, 2017). Some of the differences may be influenced by cognitive heuristics and behavioral habits acquired from exposure to digital devices. Earlier studies revealed change in habits, such as swiping and skimming that raise concern about deep-level processing and reflection (Levitin, 2014; Lui, 2006; Mangen et al., 2013).

Given the increasing adoption of digital devices across all areas in our daily lives, together with advances in form and function of devices, gaps in research and understanding of interacting influences involving reasoning skills will remain (Tappin et al., 2021; Grazzley & Rosen, 2016).

## MOTIVATED REASONING

Educators are poised to conduct research that continues to investigate differences in learning performance as conditions change.

Experimental studies by Strömbäck et al. (2020) tested ideological views and numeracy on correct responses using the rash prompt as the neutral scenario and scenarios about gender and immigration as emotional prompts. Results indicate motivated reasoning which could be driven by feelings related to personal or group identity.

This study includes two different factors for examining the effect of data interpretation in relation to reading mode and motivated reasoning. First, rather than comparing different prompts between subjects, this design presented both prompts to the same participants for a within-group comparison. This feature allowed for comparing change in responses from the neutral rash prompt to the ideological prompt about guns. Both prompts presented a comparable data table, thereby requiring the same computation and resulting with the same exact percentages for responses (Appendix A).<sup>1</sup> The second unique feature of this design are the two mode conditions, Paper and Tablet. The results extend current findings by comparing between conditions (Paper, Tablet,) and within subjects. Prior studies included numeracy tests, the cognitive reflection, or cognitive need to know (e.g., Ballarini & Sloman, 2017; Kahan, 2013; Kahan et al., 2017; Stanovich & West, 2008), whereas this study was designed to reduce mathematical difficulty and cognitive biases.

First, the data table included the totals to reduce numeracy difficulty (Appendix A). Next, participants read the neutral rash to moderate possible motivated reasoning before reading the gun prompt. This allowed for comparing the same prompts within subjects rather than between subjects.

---

<sup>1</sup> Kahan, D., Peters, E., Dawson, E., & Slovic, P. (2017). Motivated numeracy and enlightened self-government. *Behavioural Public Policy*, 1(1), 54-86. Retrieved from <https://doi.org/10.1017/bpp.2016.2>  
Adapted with permission.



## MOTIVATED REASONING

Hypotheses three tested for motivated reasoning based on political affiliation. Although the limitations of the sample size and skewed affiliation distribution did not show a statistical relationship between political party and motivated reasoning, the results showed an overall mean of 38% change in responses between the rash and gun prompts. The significant percentage in changed responses for the gun prompt suggest the importance of existing beliefs and values overall, and these may influence cognitive performance.

It is noteworthy that the 2<sup>nd</sup> Amendment concerning guns is a polarizing policy issue and related to party endorsements, affective divisions, and self-identity.<sup>2</sup> According to Pew Research Survey results, 42% of gun owners agreed to the position, “*Allow teachers and officials to carry guns in K-12 schools*” (Parker et al., 2017). Current polarization and party endorsements will require continuous efforts to examine ways to mitigate and reduce cognitive biases involving decisions, especially concerning social policies. Recent findings reveal the connections of group affiliation and dynamics with brain activity, including cognitive and emotional systems, which influence decisions and choices.

### **Limitations**

The sample for this study comprised of military adult students with approximately ten years of service. Although not a demographic representation, the convenience groups were drawn from three different leadership schools. The most homogenous factor is political affiliation, predominately Republican. In addition, a larger, more representative sample may possibly reveal other factors or patterns related to demographic or political affiliation.

---

<sup>2</sup> This study was conducted in 2019 prior to the current rise in gun violence.

## MOTIVATED REASONING

### **Implications for Educators**

Given the influence of social media on formulating beliefs and reinforce motivated reasoning, it is important for educators to understand how technology impacts cognitive processing and critical thinking as democratic citizens. This is especially crucial given the prevalence and power of false and fake information disseminated across all forms of digital devices (Kraft, Lodge, & Table, 2015; Lazer et al., 2018; Vosoughi, et al., 2018). Because only 20% of college students achieved mastery responses for evaluating digital information, it is imperative that educators understand the contributing factors and identify possible interventions (Nolan, 2017; Wineburg et al., 2016).

The results from this study reveal significant differences between digital and non-digital reading modes in relation to accuracy and motivated reasoning. Current research examines student performance for accuracy in digital environments, but less is known about the interaction of digital conditions with motivated reasoning that affects critical thinking. Considering the influence of social media in disseminating disinformation to elicit emotional response, there is a need to uncover ways to counteract cognitive information processing that impedes sound reasoning.

According to Stanovich and West (2008), those with high intelligence displayed less cognitive reasoning biases if forewarned and given instruction on what to do to avoid biases. Likewise, results of experiments by Ballarini and Sloman (2017) showed that providing a reason was an effective intervention for moderating motivated reasoning biases.

Pennycook et al. (2022) encourage educators to focus on literacy and critical thinking skills. Results from tested models suggest that cognitive sophistication may minimize vulnerability to group or personal identity protection. Considering that 80% of college students are below the

## MOTIVATED REASONING

mastery level for evaluating online information, focusing on enhancing literacy and critical thinking skills is relevant for all educators (Wineburg et al., 2016).

Educators are charged with preparing citizens of democratic societies to have open minds, seek truth, and make sound judgments. Resistance to cognitive biases may be difficult, but is not futile; there are interventions that educators can implement to foster critical thinking (e.g., critical evaluation skills, bias awareness and forewarning, diverse perspectives).

## MOTIVATED REASONING

## References

- Ballarini, C., & Sloman, S. (2017). Reasons and the “motivated numeracy effect”. *Cognitive Science Proceedings*. <https://mindmodeling.org/cogsci2017/papers/0309/index.html>
- Bolsen, T., Druckman, J. N., & Cook, F. L. (2014). The influence of partisan motivated reasoning on public opinion. *Political Behavior*, 36(2), 235–262.  
<http://www.jstor.org/stable/43653189>
- Carpenter, R., & Alloway, T. (2019). Computer versus paper-based testing: Are they equivalent when it comes to working Memory? *Journal of Psychoeducational Assessment*, 37(3), 382–394. <https://doi.org/10.1177/0734282918761496>
- Clinton, V. (2019). Reading from paper compared to screens: A systematic review and meta-analysis. *Journal of Research in Reading*, 42(2), 288–325. <https://doi.org/10.1111/1467-9817.12269>.
- Druckman, J. N. (2012). The politics of motivation. *Critical Review*, 24(2), 199–216.  
<https://www.tandfonline.com/doi/abs/10.1080/08913811.2012.711022>
- Druckman, J. N., & Bolsen, T. (2011). Framing, motivated reasoning, and opinions about emergent technologies. *Journal of Communication*, 61(4), 659–688.  
<https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1460-2466.2011.01562.x>
- Druckman, J. N., Peterson, E., & Slothuus, R. (2013). How elite partisan polarization affects public opinion formation. *American Political Science Review*, 107(1), 57–79.  
<https://pdfs.semanticscholar.org/9922/51f8870a55c4202d387c7efd66ad870ac126.pdf>
- Gazzley, A., & Rosen, L. (2016). *The distracted mind. Ancient brains in a high-tech world*. Boston, MA: MIT Press.

## MOTIVATED REASONING

- Haynes, T. (2018, May 1). Dopamine, smartphones, and you. A battle for your time. *Science in the News*. Harvard University. <http://sitn.hms.harvard.edu/flash/2018/dopamine-smartphones-battle-time/>
- Hoppe, E. I., & Kusterer, D. J. (2010). Behavioral biases and cognitive reflection. *Economics Letters*, 110, 97–100. <https://www.iame.uni-bonn.de/Behavioral%20biases%20and.pdf>
- Jost, J.T., Baldassarri, D.S. & Druckman, J.N. (2022). Cognitive–motivational mechanisms of political polarization in social-communicative contexts. *National Reviews Psychology*, 1, 560–576. <https://doi.org/10.1038/s44159-022-00093-5>
- Kahan, D. (2013). Ideology, motivated reasoning, and cognitive reflection. *Judgment and Decision Making* 8, 407-424. <http://journal.sjdm.org/13/13313/jdm13313.pdf>
- Kahan, D. (2012, Dec 5). WSMD? JA!, episode 3: It turns out that Independents are as just partisan in cognition as Democrats & Republicans after all! Cultural Cognition Project. [Web log post]. <http://www.culturalcognition.net/blog/2012/12/5/wsmd-ja-episode-3-it-turns-out-that-independents-are-as-just.html>
- Kahan, D., Peters, E., Dawson, E., & Slovic, P. (2017). Motivated numeracy and enlightened self-government. *Behavioural Public Policy*, 1(1), 54-86. <https://doi.org/10.1017/bpp.2016.2>
- Kahan, D., Peters, E., Wittlin, M., Slovic, P., Ouellette, L.L., Braman, D., & Mandel, G. (2012). The polarizing impact of science literacy and numeracy on perceived climate change risks. *Nature Climate Change* 2, 732-735. <https://www.nature.com/articles/nclimate1547>
- Kahneman, D. (2011). *Thinking, fast and slow*. New York, NY: Farar, Straus, & Giroux.

## MOTIVATED REASONING

- Kraft, P., Lodge, M., & Tabler, C. (2015). Why people “don’t trust the evidence”: Motivated reasoning and scientific beliefs, *The ANNALS of the American Academy of Political and Social Science*, 658(1), 121 – 133. <https://doi.org/10.1177/0002716214554758>
- Kunda, Z. (1990). The case for motivated reasoning. *Psychological Bulletin*, 108(3), 480–498. <https://doi.org/10.1037/0033-2909.108.3.480>
- Lazer, D., Baum, M, Benkler, Y., Berinsky, A., Greenhill, K., Menczer, F.,...& Zittrain J. (2018). The science of fake news. *Science*, 359, 1094-1096. doi:10.1126/science.aao2998. <http://science.sciencemag.org/content/359/6380/1094>
- Levitin, Daniel. (2014). *The organized mind. Thinking straight in the age of information overload*. New York, NY: Dutton.
- Liu, Z. (2005). Reading behavior in the digital environment: Changes in reading behavior over the past ten years. *Journal of Documentation*, 61(6), 700-712. [doi.org/10.1108/00220410510632040](https://doi.org/10.1108/00220410510632040)
- Loh, K., & Kanai, R. (2016, Oct). How has the Internet reshaped human cognition? *Neuroscientist*, 22(5), 506-520. doi: [10.1177/1073858415595005](https://doi.org/10.1177/1073858415595005)
- Mangen, A., Walgermo, B., & Bronnick, K. (2013). Reading linear texts on paper versus computer screen: Effects on reading comprehension. *International Journal of Educational Research*, 58, 61-68. doi: [10.1016/j.ijer.2012.12.002](https://doi.org/10.1016/j.ijer.2012.12.002)
- Molenberghs, P., & Louis, W. R. (2018). Insights From fMRI Studies Into ingroup bias. *Frontiers in psychology*, 9, 1868. <https://doi.org/10.3389/fpsyg.2018.01868>
- Myers, D. G., & Lamm, H. (1976). The group polarization phenomenon. *Psychological Bulletin*, 83(4), 602–627. <https://doi.org/10.1037/0033-2909.83.4.602>

## MOTIVATED REASONING

Niccoli, A. (2017). The effects of reading mode and format on decision making. Paper presented at the 2017 annual meeting of the *American Educational Research Association*.

<http://www.aera.net/Publications/Online-Paper-Repository/AERA-Online-Paper-Repository/Owner/993559>

Nolan, S. (2017). Critical thinking and information fluency: Fake news in the classroom. [Web log post]. Psychology Teacher Network.

<http://www.apa.org/ed/precollege/ptn/2017/05/fake-news.aspx>

Parker, K., Horowitz, J., Igielnik, R. Oliphant, B., & Brown, A. (2017, June 22). *America's complex relationship with guns*. Pew Research Center. <http://assets.pewresearch.org/wp-content/uploads/sites/3/2017/06/06151541/Guns-Report-FOR-WEBSITE-PDF-6-21.pdf>

Pennycook, G., Bence, B., & McPhetres, J. (2022). Science beliefs, political ideology, and cognitive sophistication. *Journal of Experimental Psychology: General*. Advance online publication. <https://doi.org/10.1037/xge0001267>

Pew Research Center. (2019, December). *In a politically polarized era, sharp divides in both partisan coalitions*. Pew Research Center.

<https://www.pewresearch.org/politics/2019/12/17/in-a-politically-polarized-era-sharp-divides-in-both-partisan-coalitions/>

Pew Research Center. (2014, June). *Political polarization in the American public. How increasing ideological uniformity and partisan antipathy affect politics, compromise and everyday life*. Pew Research Center.

<http://www.people-press.org/2014/06/12/political-polarization-in-the-american-public/>

## MOTIVATED REASONING

Rosenwald, M. (2014, April 6). Serious reading takes a hit from online scanning and skimming,

researchers say. *The Washington Post*. [http://www.washingtonpost.com/local/serious-reading-takes-a-hit-from-online-scanning-and-skimming-researchers-say/2014/04/06/088028d2-b5d2-11e3-b899-20667de76985\\_story.html](http://www.washingtonpost.com/local/serious-reading-takes-a-hit-from-online-scanning-and-skimming-researchers-say/2014/04/06/088028d2-b5d2-11e3-b899-20667de76985_story.html)

Schreiber, D., Fonzo, G., Simmons, A. N., Dawes, C. T., Flagan, T., Fowler, J. H., & Paulus, M.

P. (2013). Red brain, blue brain: evaluative processes differ in Democrats and Republicans. *PloS ONE*, 8(2), e52970. <https://doi.org/10.1371/journal.pone.0052970>

Slothuus, R., & de Vreese, C. H. (2010). Political parties, motivated reasoning, and issue framing effects. *The Journal of Politics*, 72(3), 630–645.

[https://www.jstor.org/stable/10.1017/s002238161000006x?seq=1#page\\_scan\\_tab\\_contents](https://www.jstor.org/stable/10.1017/s002238161000006x?seq=1#page_scan_tab_contents)

Smith, S. (2016, July 5). *5 facts about America's political independents*. Pew Research Center.

<http://pewrsr.ch/29iFwkG>

Stanovich, K., & West, R. (2008). On the relative independence of thinking biases and cognitive ability. *Journal of Personality and Social Psychology*, 94(4), 672-695. doi:

[10.1037/0022-3514.94.4.672](https://doi.org/10.1037/0022-3514.94.4.672)

Stanovich, K. E., West, R. F., & Toplak, M. E. (2013). Myside bias, rational thinking, and intelligence. *Current Directions in Psychological Science*, 22(4), 259-264.

<http://journals.sagepub.com/doi/abs/10.1177/0963721413480174>



## MOTIVATED REASONING

- Strömbäck, C., Andersson, D., Västfjäll, D., & Tinghög, G. (2021). Motivated reasoning, fast and slow. *Behavioural Public Policy*, 1-16. doi:10.1017/bpp.2021.34.  
<https://www.cambridge.org/core/journals/behavioural-public-policy/article/motivated-reasoning-fast-and-slow/2AC99FF3B8906B4F9E9B27DCD59F7FF6>
- Tappin, B. M., Pennycook, G., & Rand, D. G. (2021). Rethinking the link between cognitive sophistication and politically motivated reasoning. *Journal of experimental psychology. General*, 150(6), 1095–1114. <https://doi.org/10.1037/xge0000974>
- Toplak M. E., West R. F., & Stanovich, K. E. (2014). Assessing miserly information processing: An expansion of the Cognitive Reflection Test. *Thinking & Reasoning*, 20(2), 147–168.  
[http://keithstanovich.com/Site/Research\\_on\\_Reasoning\\_files/Toplak\\_West\\_Stanovich\\_14.pdf](http://keithstanovich.com/Site/Research_on_Reasoning_files/Toplak_West_Stanovich_14.pdf)
- Umejima, K., Ibaraki, T., Yamazaki, T., & Sakai, K. L. (2021). Paper Notebooks vs. Mobile Devices: Brain Activation Differences During Memory Retrieval. *Frontiers in Behavioral Neuroscience*, 15, 634158. <https://doi.org/10.3389/fnbeh.2021.634158>
- Vosoughi, S., Roy, D., & Aral, S. (2018, March 9). The spread of true and false news online. *Science*, 359(6380), 1146-1151. DOI: [10.1126/science.aap9559](https://doi.org/10.1126/science.aap9559)  
<http://science.sciencemag.org/content/359/6380/1146.full>
- Walker, T. (2021, July 14). Teaching in an era of polarization *NEA Today*.  
<https://www.nea.org/advocating-for-change/new-from-nea/teaching-era-polarization>
- Westen, D., Blagov, P., Harenski, K., Kilts, C., & Hamann, S. (2006). Neural bases of motivated reasoning: An fMRI study of emotional constraints on partisan political judgement in the 2004 U.S. presidential election. *Journal of Cognitive Neuroscience*, 18(11), 1947-1958.  
 doi: [10.1162/jocn.2006.18.11.1947](https://doi.org/10.1162/jocn.2006.18.11.1947)

## MOTIVATED REASONING

Wineburg, S., McGrew, S., Breakstone, J., & Ortega, T. (2016). *Evaluating information: The cornerstone of civic online reasoning*. Stanford Digital Repository.

<http://purl.stanford.edu/fv751yt5934>

Wischnewski, M., & Krämer, N. (2021). The role of emotions and identity-protection cognition when processing (mis)information. *Technology, Mind, and Behavior*, 2(1).

<https://doi.org/10.1037/tmb0000029>

## MOTIVATED REASONING

**Table 1***Political Party**(N = 47)*

	<b>Neutral</b>	<b>Democrat</b>	<b>Republican</b>
<b>Paper</b>	4	7	14
<b>Tablet</b>	4	2	16

**Table 2***Modes**(N = 47)*

<b>Mode</b>	<b>Correct</b>	<b>Incorrect</b>
<b>Paper(n=25)</b>		
<b>Tablet (n=22)</b>		

## MOTIVATED REASONING

**Table 3***Responses by Mode Condition**(N = 47)*

	<b>Correct</b>	<b>Incorrect</b>
<b>Paper (n=25)</b>	15	10
<b>Tablet (n=22)</b>	5	17

**Table 4***Motivated Change by Affiliation**(N = 47)*

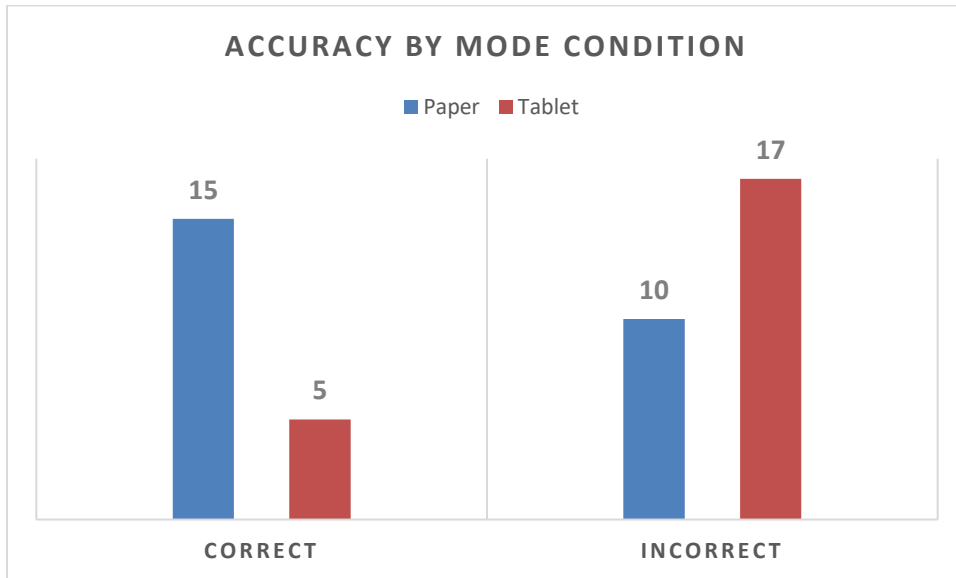
<b>Affiliation</b>	<b>Change</b>
Democrats (n=9)	28%
Republicans (n=30)	36%
Neutral (n=8)	50%

*Note:* Change refers to change in accuracy between prompts

**Figure 1**

*Correct Responses by Mode*

(*N* = 47)



## MOTIVATED REASONING

**Appendix A**

1. Medical researcher developed a new cream for treating skin rashes. New treatments often work but sometimes make rashes worse. Researcher conducted an experiment on patients with skin rashes. In the experiment, one group of patients used the new cream for two weeks and a second group did not use the new cream.

In each group, the number of people whose skin condition got better and the number whose condition got worse are recorded in the table below.

Rash	Worse	Better	<b>Total</b>
Patients who <u>did</u> use the new skin cream	223	75	<b>298</b>
Patients who did <u>not</u> use the new skin cream	107	21	<b>128</b>

Please indicate whether the experiment shows that using the new cream is likely to make the skin condition better or worse (compared to not using the cream).

**Better**\_\_\_\_\_

**Worse**\_\_\_\_\_

MOTIVATED REASONING

**Appendix A (continued)**

- 2. Government officials were unsure whether a law banning private citizens to carry concealed handguns in public would decrease crime by reducing the number of weapons that people carry or increase crime by making it harder for law abiding citizens to defend themselves.

The table below is crime data for cities that ban carrying concealed weapons and cities that do not ban carrying concealed weapons.

Crime	Increase	Decrease	Total
Cities that <u>did</u> ban carrying concealed handguns in public	669	225	<b>894</b>
Cities that did <u>not</u> ban carrying concealed handguns in public	321	63	<b>384</b>

Please indicate whether data supports the conclusion that cities that did ban carrying concealed guns increased crime compared to cities that did not ban.

**Yes (increased for bans)**\_\_\_\_\_

**No (decreased)**\_\_\_\_\_

---

Kahan, D., Peters, E., Dawson, E., & Slovic, P. (2017). Motivated numeracy and enlightened self-government. *Behavioural Public Policy*, 1(1), 54-86. Retrieved from <https://doi.org/10.1017/bpp.2016.2> Adapted with permission.

## Appendix B

### DATA INTERPRETATION ANSWER SHEET

---

#### CREAM DATA

Please indicate whether the experiment shows that using the new cream is likely to make the skin condition better or worse (compared to not using the cream).

**Better** \_\_\_\_\_

**Worse** \_\_\_\_\_

---

#### GUN BAN

Please indicate whether data supports the conclusion that cities that did ban carrying concealed guns increased crime compared to cities that did not ban.

**Yes (increased for bans)** \_\_\_\_\_

**No (decreased)** \_\_\_\_\_

**I consider my political views leaning towards:**

**Democrat**

**Republican**

---

Kahan, D., Peters, E., Dawson, E., & Slovic, P. (2017). Motivated numeracy and enlightened self-government. *Behavioural Public Policy*, 1(1), 54-86. Retrieved from <https://doi.org/10.1017/bpp.2016.2> Adapted with permission.