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### Inducing cognitive reflection and its impact on contradictory beliefs.

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Inducing Cognitive Reflection and its Impact on Contradictory Beliefs

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### **Abstract**

Currently, there is extensive research within psychology about two distinct processing models where one is fast, automatic, and relatively effortless and the other is slow, systematic, and effortful. One mechanism of effortful processing is cognitive reflection which is one's ability to reflect on their intuition. While there is research on explicit instructions of certain cognitive mechanisms and implicit induction of cognitive reflection, there is a lack of research on the explicit induction of cognitive reflection specifically. In this study, two techniques were investigated to see if cognitive reflection could be explicitly induced. Participants either read a prompt before beginning the CRT, received feedback about the incorrect and correct answers following each CRT question, or simply took the CRT without any induction techniques. Additionally, a yea-yeaing score was collected to measure how often a person agrees with a statement and its opposite (i.e., endorses contradictory beliefs). The results revealed that a prompt prior to CRT completion is an effective explicit induction technique that significantly increases numerical CRT scores. Contradictory belief holding was not impacted by explicit induction of cognitive reflection. Implications and future directions for this research are explored.

*Keywords:* cognitive reflection, explicit induction, contradictory beliefs, dual processing

### **Inducing Cognitive Reflection and its Impact on Contradictory Beliefs**

Slower and more effortful thinking can override automatic responses when a person consciously considers alternative answers or ideas. For example, when a person encounters someone of a different race, they are automatically aware of associations they have learned over the course of their life. Typically, this information is stereotypical and results from media representations, comments from family or peers, or salient interactions. A nonprejudiced response requires the intentional activation of nonprejudiced personal beliefs and the inhibition of automatically activated stereotypes (Devine, 1989). One specific type of effortful thinking is cognitive reflection, which is a person's ability to second-guess their intuition. This study investigated how two ways of overriding automatic processing impact a person's ability to reflect and their belief consistency. Cognitive reflection is one of many rule-based processing mechanisms which are part of a dual-process model.

#### **Dual-Process Models in Psychology**

Smith and DeCoster (2000) proposed a model that includes associative and rule-based processing which draw on two different memory systems in different ways. The two memory systems are fast and slow learning. Fast learning is controlled by the hippocampus and mediates conscious, explicit recollection. Slow learning is controlled by overlapping sensory, perceptual, and motor systems and forms stable, general representations of the environment over time. Associative processing draws on the slow learning system and is structured by similarities over time. This type of processing occurs preconsciously and automatically. In contrast, rule-based processing draws on both slow and fast learning systems. Rule-based processing draws on symbolically represented rules that are structured by language and logic. These representations

can be learned from as little as one experience and occur consciously when cognitive capacity and motivation are present.

This dual-process model has many implications including stereotypes and rational versus intuitive reactions. Devine (1989) proposed a dual-process framework of stereotyping in which automatic stereotyping may be suppressed by those who effortfully override their intuitive response by accessing personal beliefs about a group. Donovan & Epstein (1997) applied the Cognitive Experiential Self-Theory (CEST) to reasoning by using the conjunction fallacy. Their theory proposed that one mode, termed experiential, was preconscious, automatic, and intuitive. The other mode, termed rational, was conscious and effortful. When applied to the Linda problem (see Table A), many people rely on the experiential mode that focuses on associations between Linda's characteristics and the typical characteristics of a feminist despite the logical rules of probability that validate the other answer. This is an example of how automatic, preconscious thinking can lead people to incorrect answers and demonstrates the existence of two modes of processing. The Linda problem implies that either processing mode could be used in any given instance and perhaps a more effortful mode could be induced.

### **Table 1**

#### *The Linda Problem*

Linda is 31 years old, single, outspoken, and very bright. She majored in philosophy. As a student, she was deeply concerned with issues of discrimination and social justice, and participated in anti-nuclear demonstrations.

Which is more probable?

1. Linda is a bank teller.\*
2. Linda is a bank teller and is active in the feminist movement.

*\*Answer 1 is more probable*

## **Cognitive Reflection**

One mechanism of effortful thinking is cognitive reflection, which is one's propensity to reflect on their intuitions (Pennycook et al., 2020). Cognitive reflection is slow, systematic, and effortful, and can be contrasted with heuristic thinking, which is fast, intuitive, and relatively effortless. If more effortful thinking, such as cognitive reflection, could be induced, this may have an important effect on stereotype holding and illogical thought. Cognitive reflection induction may increase belief consistency by promoting reflection among those who are not likely to doubt their intuitions. For example, cognitive reflection induction could be used in classrooms to promote critical thinking skills, in Congress to improve political discourse, and in communities to increase nonprejudicial responses among prejudiced groups.

One way to measure people's natural inclination to engage in cognitive reflection is by using the *Cognitive Reflection Test (CRT)* (Frederick, 2005). The CRT comprises three math-based questions with intuitively appealing but incorrect numerical answers. To perform well on the test, individuals must resist the intuitive appeal of the incorrect answers and think their way through to the correct but nonobvious answers. Higher scores on the CRT indicate a greater tendency to spontaneously reflect on, and possibly reject, one's own intuition. The traditional version of the CRT from Frederick's (2005) study includes 3 numerical questions. Additional verbal questions have also been used to mitigate the impact of math anxiety and poor math skills on performance (Sirota et al., 2020).

CRT performance has been linked to many important outcomes. For example, lower CRT performance has been linked to greater belief in conspiracy theories (Swami et al., 2014) greater tendency to hold religious beliefs (Bahçekapili & Yilmaz, 2017; Gervais & Norenzayan, 2012;

Pennycook et al., 2012; Shenhav, Rand, & Greene, 2011) and greater social conservatism (Deppe et al., 2015; Alós-Ferrer & Hügelschäfer, 2016).

### **Explicit Induction of Cognitive Reflection**

Instructions can be a helpful tool when trying to induce a certain behavior among participants and has been used extensively in psychological research. For example, researchers found that explicit instructions prior to completing the Implicit Association Test (IAT; Greenwald, McGhee & Schwartz, 1998) could both increase and decrease pro-White implicit bias (Wallaert, Ward & Mann, 2010). In the first study, the researchers used an explicit instruction that told participants to respond like someone who has a strong preference for White people over Black people. In the second study, the participants were instructed to avoid stereotyping. Wallaert et al. (2010) found that a simple, explicit directive was effective in altering automatic/implicit associations.

Similarly, cognitive reflection may be explicitly induced prior to taking the CRT to induce reflection on the test. Explicit induction means directly stating the purpose of the CRT (i.e., to test people's ability to resist their intuitions) or explaining the correct and incorrect CRT responses to promote better performance. By stating the purpose of the CRT, participants may be more likely to question their immediate responses and further examine other answers. Similarly, by explaining why people may decide on the incorrect, intuitive answer and explaining how to determine the correct answer, participants may be less likely to input the first answer that comes to mind when they move to the next problem. In other words, these techniques might elicit more cognitive reflection by alerting participants that their intuitions may be incorrect.

Explicit induction can be contrasted with implicit cognitive reflection induction, in which primes or format changes to the CRT elicit better performance. For example, Swami et al. (2014)

used scrambled-sentence tasks and font processing disfluency to implicitly induce cognitive reflection. The scrambled-sentence task involves a list of words that must be rearranged to form a sentence. The researchers included words related to analytic or rational reasoning (e.g., *analyze, reason, ponder, think, rational*) to implicitly prime the participant to engage in cognitive reflection. Processing fluency is the ease with which information is processed (Alter et al., 2009). Swami et al. (2014) used difficult-to-read fonts to implicitly induce analytic thinking because disfluency triggers deeper information processing.

Implicit induction research contributes to our understanding of unconscious processes that may contribute to cognitive reflection. Explicit induction research would contribute to overall understanding of how cognitive reflection works by focusing on conscious processes. Better understanding of the conscious processes underlying cognitive reflection may allow for more effective induction methods if explicit induction produces greater reflection than implicit induction techniques.

### **Contradictory Belief Holding**

People who are relatively unlikely to spontaneously engage in cognitive reflection may also be unlikely to reflect on their beliefs and recognize inconsistencies between them. Cognitive reflection induction may increase belief consistency by promoting reflection among those who are not likely to doubt their intuitions. An inconsistency in beliefs in which someone endorses opposing statements is contradictory belief holding. For example, someone may believe that human beings have inherent worth regardless of their accomplishments, especially when that person is anonymous to them. The same person may also believe that a person's worth is based on their productivity and work ethic when that person is a coworker or a citizen on welfare. Both scenarios are about what constitutes a human's worth, but this individual holds views that are in



opposition based on circumstance (i.e., their belief is inconsistent). Cognitive reflection induction may allow said person to recognize the inconsistencies within their beliefs and promote better understanding of their own beliefs and the beliefs of others.

If cognitive reflection is related to contradictory belief holding, it may also be associated with other individual difference factors that have been previously correlated with contradictory belief holding. For example, Altemeyer (1996) found that higher rates of “yea-yeaing” (i.e., contradictory belief holding) were correlated with authoritarianism. Authoritarianism, or strict adherence to authority figures, has been linked to prejudicial thinking (Allport, 1954; Ekehammar et al., 2004; Laythe et al., 2002). By investigating the relationship between cognitive reflection and these three individual difference factors (yea-yeaing, authoritarianism, and prejudice), research could explore the usefulness of cognitive reflection induction on reducing contradictory belief holding and prejudice.

### **Current Study**

The present study examined if cognitive reflection could be induced among participants, and if this induction decreased contradictory belief holding. Participants were randomly assigned to one of three conditions. In the *control condition*, participants completed the CRT without additional instruction or feedback. In the *feedback condition*, participants received feedback after completing each question, which explained why the intuitive answer was incorrect and how the correct answer could be deduced. In the *prompt condition*, participants received explicit instructions prior to the CRT that explained the test’s purpose and encouraged effortful thinking.

Following the CRT, participants completed a yea-yeaing test. The test included 2 sets of 10 contradictory statement pairs which each consisted of opposing belief statements (e.g., *the key to success is maintaining a healthy balance between work and life, the most successful people*

*are those who put their work above all else*). Participants had three response options: *Agree*, *Disagree*, or *Don't Know*. The test determined how many times participants agreed with a statement in one set and its contradiction in the other. The yea-yeaing test was followed by a questionnaire that assessed political ideology and authoritarianism. The questionnaire responses were used to determine if individual difference factors correlated with CRT performance and/or yea-yeaing results.

I predicted that explicit induction techniques would improve performance on the CRT when compared to the control condition. I hypothesized that lower rates of cognitive reflection would be correlated with higher rates of yea-yeaing. I also expected that providing an explicit induction technique before/during the CRT would decrease the rate of yea-yeaing among participants. Such findings would indicate that cognitive reflection can be induced, and this induction results in a decrease of inconsistent beliefs. Additionally, I predicted that lower CRT scores would be correlated with higher authoritarianism, political conservatism, and yea-yeaing scores.

## **Methods**

### **Participants**

Participants were undergraduate students ( $N = 98$ ;  $M_{age} = 19.46$  years,  $SD = 2.378$ , 66.3% female) who participated for research credit in their psychology courses. Three students were excluded from the data due to incomplete data on the Cognitive Reflection Test.

### **Design**

This study has an experimental design with three conditions. The independent variable was cognitive reflection test structures with 3 levels. Participants were randomly assigned to either the control condition ( $n=33$ ), the prompt condition ( $n=34$ ), or the feedback condition

( $n=31$ ). The dependent variable was the effect of CRT test structure on CRT performance and yea-yeaing results. A between-subjects design was used to analyze CRT and yea-yeaing performance across the different conditions. This study also utilized a correlational design when analyzing individual difference factors and experimental results. Correlations were analyzed between CRT score and political conservatism, CRT score and authoritarianism score, yea-yeaing test results and political conservatism, and yea-yeaing test results and authoritarianism score.

## **Materials**

### ***Cognitive Reflection Test***

Two versions of the Cognitive Reflection Test were used: a three-question numerical subscale (Frederick, 2005) and a two-item verbal subscale (Sirota et al., 2020). Participants were asked to input their answers to the five items ( $\alpha=0.58$ ) with varying amounts of directions and feedback depending on the condition. The CRT questions, prompts, and feedback are listed in Appendix A.

### ***Yea-yeaing Test (Altemeyer, 1996)***

A yea-yeaing test was conducted in which participants were asked to respond to two sets of 15 statements with *Agree*, *Disagree*, or *Don't Know*. This test was used to assess the number of contradictory beliefs the participants endorsed. For example, in the first set participants would respond to the statement, "people are largely responsible for their own outcomes in life," and in the second set they would respond to, "outcomes are primarily determined by forces outside of people's control." If a participant agreed with both statements, they would receive one point on their yea-yeaing score. The contradictory statement sets can be found in Appendix B.

### ***Questionnaire***

The questionnaire assessed political ideology and authoritarianism. Participants ranked their political ideology on a scale of 1 to 11, where 1 is very liberal and 11 is very conservative. Then, participants responded to 12 political topics on a scale of 1 to 7 where 1 is strongly agree and 7 is strongly disagree (Deppe et al., 2015). Some of the topics include gay marriage, stem cell research, and school prayer. Two political ideology measures were used to obtain an accurate representation of each participant's political affiliation. The full version of both political ideology scales can be found in Appendix C. The authoritarianism scale had 4 questions where participants picked which of two traits were more important in children. For example, "is it more important for children to be self-reliant or obedient?" The full authoritarianism scale can be found in Appendix D.

### **Procedure**

Following informed consent, participants were seated at individual computer stations in lab sessions of up to five people. Participants were randomly assigned to a condition based on the order in which they arrived at the lab. Participants completed the CRT followed by the yeaying test. Then, participants completed a questionnaire on political ideology and authoritarianism. Lastly, participants were debriefed. The session lasted approximately 15-30 minutes.

## **Results**

### **Cognitive Reflection Test Scores**

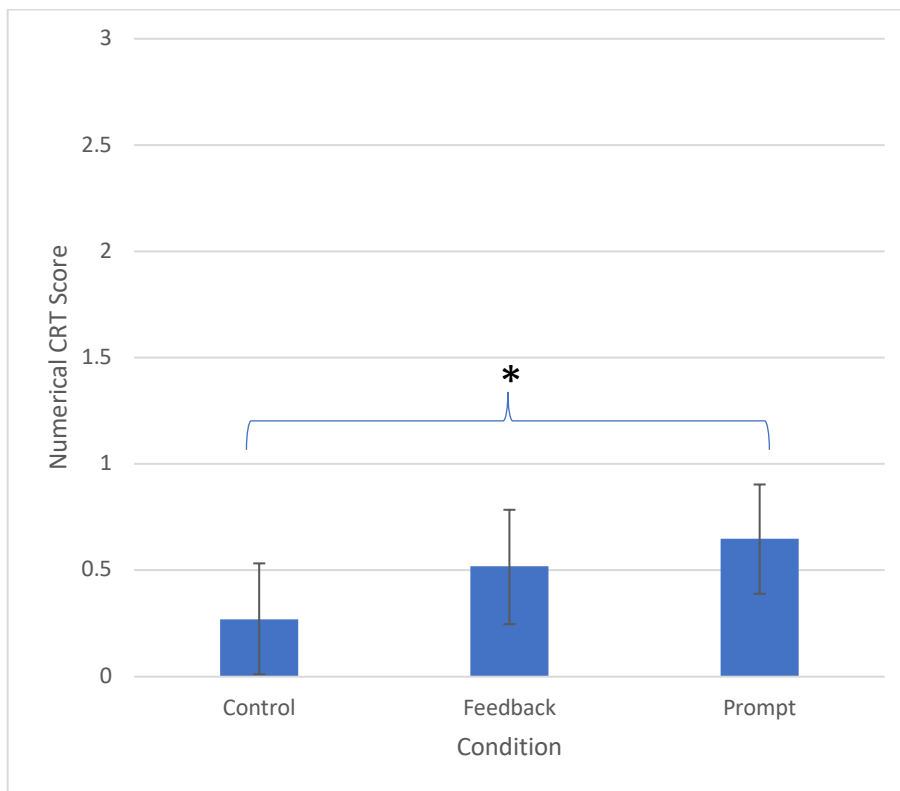
#### ***Numerical Questions***

A between-subjects ANOVA did not reveal an effect of condition on Numerical CRT scores,  $F(2,95)=2.12, p=.13, \eta_p^2=.04$ . However, we conducted planned contrasts between each

condition using the least significant difference (LSD) test (see Figure 1). Participants in the prompt condition ( $M=0.65$ ,  $SD=0.92$ ) scored significantly higher on the numerical CRT questions than participants in the control condition ( $M=0.27$ ,  $SD=0.57$ ),  $p=.045$ . Numerical CRT scores for participants in the feedback condition ( $M=0.52$ ,  $SD=0.72$ ) and control conditions did not differ significantly,  $p=.19$ , nor did numerical CRT scores for participants in the feedback and prompt conditions,  $p=.49$ .

### Figure 1

*Numerical CRT Scores as a Function of Condition*



\*Statistically significant result at  $p<.05$

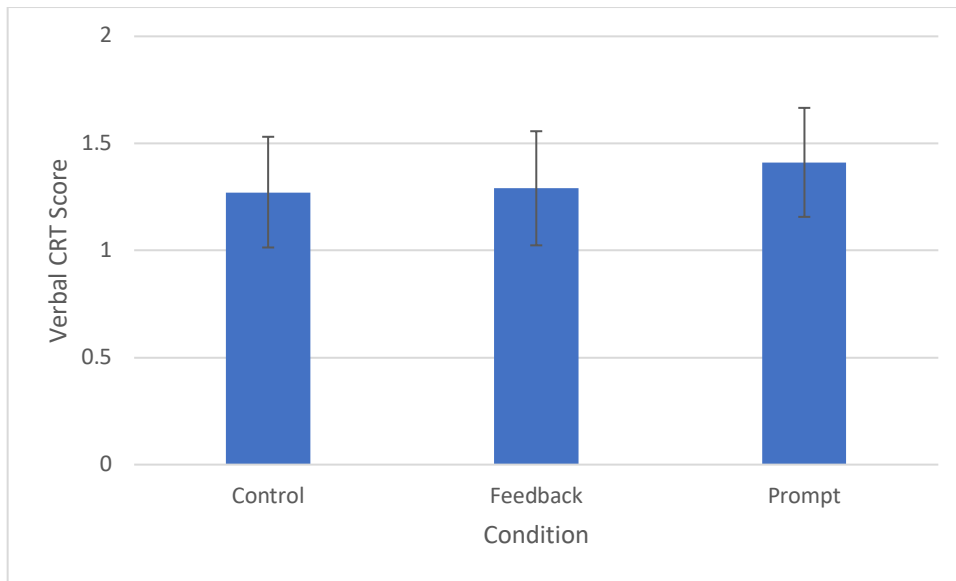
### *Verbal Questions*

A between-subjects ANOVA also did not reveal a main effect of condition for the verbal questions,  $F(2,95)=0.34$ ,  $p=.71$ ,  $\eta_p^2=0.01$ . Planned comparison revealed no significant

differences between individual conditions (prompt condition:  $M=1.41$ ,  $SD=0.74$ , feedback condition:  $M=1.29$ ,  $SD=0.78$ , control condition:  $M=1.27$ ,  $SD=0.72$ ).

## Figure 2

*Verbal CRT Scores as a Function of Condition*



## Individual Differences Questionnaires

Next, the individual difference factors were examined to see if they were associated with CRT performance. A between-subjects ANOVA did not reveal a main effect of condition on yea-yeaing scores,  $F(2,95)=0.39$ ,  $p=.68$ ,  $\eta_p^2=0.01$ . As shown in Table 2, simple correlations showed that lower scores on the numerical CRT ( $r=-.25$ ,  $p=.01$ ) and the verbal CRT ( $r=-.23$ ,  $p=.02$ ) were associated with greater political conservatism. Lower scores on the numerical CRT were associated with more authoritarian beliefs ( $r=-.23$ ,  $p=.02$ ). Higher yea-yeaing scores were positively associated with political conservatism ( $r=.22$ ,  $p=.03$ ) and authoritarian beliefs ( $r=.25$ ,  $p=.03$ ).

**Table 2***Simple Correlations for Quiz Scores and all Subscales*

	1.	2.	3.
1. Numerical CRT Score	1	.41**	-.14
2. Verbal CRT Score	.41**	1	-.18
3. Yea-Yeaing Score	-.14	-.18	1
4. Conservatism Score	-.25*	-.23*	.22*
5. Authoritarianism Score	-.23*	-.15	.25*

\*\* $p < .01$ , \* $p < .05$ 

### Discussion

The current study investigated if cognitive reflection could be explicitly induced through a prompt and/or feedback. The prompt was given prior to CRT completion and explained the CRT's purpose and encouraged effortful thinking. The feedback explained why the intuitive answer was incorrect and what the correct answer was. This study also explored how contradictory belief holding (i.e., yea-yeaing) was impacted by explicit cognitive reflection induction techniques. The prompt condition significantly improved numerical CRT performance compared to the control condition. The feedback condition did not differ significantly from either the prompt or control condition. There was no significant difference of condition on yea-yeaing scores. Based on these results, it can be concluded that using a prompt that explains the purpose of the CRT is an effective way to explicitly induce cognitive reflection. Participants scored higher on average when they were aware of what the CRT was measuring before beginning the test.

These results support our hypothesis that explicit induction would improve CRT performance, but only in the prompt condition and only on the numerical CRT. By using a prompt prior to completion of the CRT, participants were more likely to engage in effortful, rule-based processing rather than effortlessly answering the questions with associative processing (cf. Smith & DeCoster, 2000). The prompt explicitly states that the following task measures cognitive reflection which is one's ability to second guess their intuition. By stating the purpose, participants can draw on rules structured by language and logic while completing the task (Smith & DeCoster, 2000).

CRT performance was only significantly improved in the prompt condition and not in the feedback condition. This may be because the feedback provided specific reasoning for why each intuitive answer was incorrect and explained how to find the correct answer for the previous problem. This induction technique did not encourage more reflective thinking overall and perhaps did not create a general rule that could be utilized by participants' rule-based processing systems. Another possibility is that an effect of feedback would be found with a larger sample size. If so, that finding would indicate that feedback can also induce explicit reflection, but potentially to a smaller degree than the prompt.

The prompt only significantly improved numerical CRT performance, not verbal CRT performance. This may be because the numerical CRT questions are typically more difficult and have lower scores which leaves more room for improvement. Another reason may be that the verbal CRT only included 2 questions and therefore has lower scale reliability than the numerical CRT. More verbal CRT questions may demonstrate a more discernable effect of explicit cognitive reflection induction.



**Contradictory Belief Holding (Yea-Yeaing)**

We hypothesized that explicit induction of cognitive reflection would not only improve CRT results but also reduce contradictory belief holding. This prediction was not supported, and this may be for multiple reasons. The prompt was effective at improving CRT scores, but the effect did not carry over into the yea-yeaing test. This effect indicates that any effortful, rule-based processing that was induced by the prompt was not global but was instead specific to the CRT. Alternatively, perhaps the effects of the prompt had become reduced over time and were therefore less effective by the time participants completed the yea-yeaing test.

Perhaps an additional prompt that promotes effortful thinking prior to the yea-yeaing test would have elicited higher cognitive reflection and reduced contradictory belief holding. Additionally, most participants had low yea-yeaing scores across all three conditions (less than 4, the max score possible being 10). This restricted range may have decreased the likelihood of seeing yea-yeaing score reduction if most participants did not hold contradictory beliefs in the first place. To test this, a yea-yeaing test should be conducted prior to explicit cognitive reflection induction and after. By using a within-subjects analysis, it could be determined if participants are endorsing fewer contradictory beliefs after viewing a prompt that encourages reflection.

**Individual Differences**

There were significant correlations between several individual difference variables and CRT scores. Lower CRT scores (numerical and verbal) were associated with higher political conservatism, consistent with Deppe et al. (2015). Higher political conservatism was also correlated with higher yea-yeaing scores. Additionally, higher yea-yeaing scores were correlated

with greater authoritarianism, consistent with Altemeyer's (1996) findings. Greater authoritarianism was also correlated with lower numerical CRT scores.

These findings show that CRT performance is linked to authoritarianism, which has been linked to prejudicial thinking (Allport, 1954; Ekehammar et al., 2004; Laythe et al., 2002). The connection between these individual difference factors point to a potential relationship between CRT performance and prejudicial thinking. If cognitive reflection can be explicitly induced, and is in fact related to prejudice, then prejudice may be reduced by utilizing cognitive reflection induction. Future research should further analyze this relationship.

### **Limitations**

This study shows promising results within a small sample of undergraduate students, but there are limitations. Due to the low number of questions and the level of difficulty of the CRT, the scale has low reliability. Low scale reliability, combined with a small sample size, resulted in low ability to detect effects of condition. As noted above, these factors may be an additional reason why the feedback condition did not have a significant effect on CRT performance or year-long scores. It should also be noted that all the participants in this study were undergraduate students. More data needs to be collected to make these conclusions more generalizable to the public.

### **Conclusions**

This study demonstrated that a prompt prior to CRT completion is an effective explicit induction technique to improve cognitive reflection skills among undergraduate students. This finding could be foundational for continued research on how cognitive reflection skills may be improved to reduce prejudice. By identifying specific techniques that result in increased rule-based processing, perhaps associative processing that categorizes others based on stereotypes

may be decreased. Explicit instructions have been found to reduce implicit bias on the Implicit Associations Test (Wallaert, Ward & Mann, 2010), and therefore may be useful to reduce explicit bias as well. Future research could use a prompt to explicitly induce cognitive reflection prior to participants responding to a prejudice scale to intentionally activate nonprejudiced beliefs and inhibit automatic stereotypes. Future research should also investigate a direct link between CRT performance and prejudicial thinking. This could be done by assessing correlations between CRT performance and responses to a prejudicial thinking scale. Cognitive reflection may be a useful tool to combat prejudice and stereotypes in the future.

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## Appendix A

### ***CRT questions:***

#### *Numerical:*

1. A bat and a ball cost \$1.10 in total. The bat costs a dollar more than the ball. How much does the ball cost? \_\_\_\_ cents [Correct answer: 5 cents; intuitive answer: 10 cents]
2. If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets? \_\_\_\_ minutes [Correct answer: 5 minutes; intuitive answer: 100 minutes]
3. In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake? \_\_\_\_ days [Correct answer: 47 days; intuitive answer: 24 days]

#### *Verbal:*

4. Mary's father has 5 daughters but no sons—Nana, Nene, Nini, Nono. What is the fifth daughter's name probably? (correct answer: Mary, intuitive answer: Nunu)
5. If you were running a race, and you passed the person in 2nd place, what place would you be in now? (correct answer: 2nd, intuitive answer: 1st)

### ***Prompt:***

The following tasks are designed to determine your cognitive reflection abilities. In other words, these questions assess your ability to second guess your instinctual responses. This task is merely for data collection purposes and should not be stressful. Just do your best and think carefully about each response.

### ***Feedback:***

#### *Numerical:*

1. People sometimes think the answer to this question is 10 cents. But this is incorrect because if the ball cost 10 cents and the bat is a dollar more than the bat would have to cost \$1.10 and the total would be \$1.20. The correct answer is 5 cents because then the bat would cost \$1.05 and the total would be \$1.10.
2. People sometimes think the answer to this question is 100 minutes. However, this is incorrect because it takes one machine 5 minutes to make one widget. So 100 machines can make 100 widgets in 5 minutes, each machine making 1 widget every 5 minutes. Therefore, the correct answer is 5 minutes.
3. People sometimes think the answer to this question is 24 days. This answer is incorrect because the patch doubles every day so if the lake was half covered on the 24th day, it would be completely covered on the 25th day. The correct answer is 47 days because the lily pad patch then doubles to completely cover the lake on the 48th day.

#### *Verbal:*

4. People sometimes think the correct answer to this question is Nunu because they see a vowel pattern in the previous 4 names. This is incorrect because the question states that Mary is one of the daughters, making her the fifth daughter in question.
5. People sometimes think the answer to this question is 1st place because you are passing the person who was in 2nd. However, you would be taking over the 2nd place position and would still be behind the runner in 1st.



**Appendix B***Contradictory Statement Pairs:*

<b>Statement:</b>	<b>Opposite:</b>
People are largely responsible for their own outcomes in life.	Outcomes are primarily determined by forces outside of people's control.
Stealing is never acceptable.	It's okay to download pirated media and software online.
Human beings have inherent worth that has nothing to do with what they accomplish in their lives.	A person's worth is based on their productivity and work ethic.
Housing is not a right and the cost of housing should be determined by the market.	Every person has the right to housing, regardless of ability to pay for it.
The key to success is maintaining a healthy balance between work and life.	The most successful people are those who put their work above all else.
Society should constantly be changing and adapting to new circumstances.	Maintaining traditional values is good for society.
We should help others, especially those living in poverty.	People on government welfare are lazy and do not deserve taxpayer money.
People who work hard can find success no matter what situation they were born into.	Some people's situations are so challenging that no amount of work will allow them to find success.
Young people with new, fresh ideas should lead the way when making decisions about a country's future.	When it comes time to make important decisions about the future, we need leaders with many years of relevant experience.
People should be free to do what they like as long as it doesn't hurt anyone.	Even if their actions don't harm anyone, there are certain disgusting things people simply shouldn't do.

## Appendix C

### *Political Affiliation Questionnaire:*

#### **Part A:**

Rate your political ideology on a scale of 1 to 11 where 1 is very liberal, 11 is very conservative, and 6 is moderate.

#### **Part B:**

Here is a list of various topics. Please indicate how much you agree or disagree with each topic. [Response options: 1) strongly agree; 2) agree; 3) somewhat agree; 4) neither agree nor disagree; 5) somewhat disagree; 6) disagree; 7) strongly disagree]

- School prayer
- Premarital sex\*
- Gay marriage\*
- Abortion rights\*
- Evolution\*
- Biblical Truth
- Stem cell research\*
- Abstinence-only sex education
- Stop illegal immigration
- Death penalty
- Increase military spending
- Allowing torture of terrorism suspects

\*Reverse coded so higher scores indicate more conservative beliefs

**Appendix D***Authoritarianism Scale:*

Among the attributes listed below, which ones do you think are the most important for a child to have? For each pair select only one option.

- Pair A: Independence *or* Respect for Others
- Pair B: Self-Reliance *or* Obedience
- Pair C: Curiosity *or* Good Manners
- Pair D: Being Considerate *or* Being Well-Behaved