The tired and the blind. The effect of cognitive load on social norms.

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Abstract

In this study, we conducted a laboratory experiment to examine the effects of increasing the cognitive load over rule-following propensity, normative expectations, and personal normative beliefs. We vary the intensity of the cognitive load that individuals were exposed to before they performed rule-following and social norm-eliciting propensity tasks. We find that subjects in the high cognitive load condition are less prone to completely break the rule and engage in less extreme behaviors. We find a different composition of types of personal normative beliefs due to the high cognitive load condition. In particular, we see a decrease in individuals with very strict (i.e., deontic) types and an increase in non-standard types of personal normative beliefs. There are no effects on the normative expectations.

Keywords: Social Norms; Cognitive Load; Normative Behavior; ;

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1 Introduction

Social norms are used to model human decision-making; it is common to use norms actively in so-called social norms interventions. For example, we can find interventions using social norms to increase healthy behaviors (Gaube et al., 2018; Howland et al., 2012), energy saving (Beshears et al., 2015; Allcott, 2009) and decrease alcohol consumption (Wechsler et al., 2003; Halim et al., 2012). These social norms interventions are based on the idea that behavior is influenced by perceptions of what "normal" or "appropiate" behavior is in a social context. For this reason, social norms can provide a powerful instrument to influence attitudes, intentions, and choices.

Rule-following determines how to make decisions in social situations and play a crucial role in cooperative relationships and coordinating groups (Gross and De Dreu, 2021). Also, the benefits of having a "good image" such as trustworthiness can be an important driver behind norm-following propensity (Schwardmann and van der Weele, 2019). But sometimes what a person wants to do (e.g., buy ice cream) can sometimes clash with what social norms suggest (e.g., wait a certain amount of time in a queue). As a result, conforming to social norms should necessitate self-regulation (the process of controlling one's thoughts and emotions). In these situations, the individual must exert self-control in order to adhere his behavior to social norms, and this could be effortful (Gailliot et al., 2012).

Recent studies have focused on the effect of context on perceptions of social behavior and social norms elicitation (Krysowski and Tremewan, 2020; Bogliacino and Montealegre, 2020). For example, common situational variables such as sleep deprivation, food restriction, multitasking, economics shocks have been shown to affect decision-making processes (Peng et al., 2020; Mani et al., 2013; Faulkner et al., 2007; Howland et al., 2012).

We hypothesize that one psychological mechanism that explains the effect of situational variables over social norms is an increase in cognitive load. Cognitive load is a psychological construct that defines the demand placed on working memory resources. Working memory is a high-order cognitive

ability, in charge of the storage and use of information in the short term. Increasing working memory demand (i.e., the cognitive load) depletes cognitive resources that theoretically could be directed toward the decision-making process (i.e., following norms). Indeed, increases in cognitive load have been associated to self-control depletion (Schulz et al., 2014; Deck and Jahedi, 2015).

In this study, we explore how social norms and rule-following behavior is affected when there is an increase in cognitive demand. To address this question, we performed an incentivized controlled experiment.

Through the use of a working memory task known as the N-back, that consist in keeping in memory a sequence of letters and reporting whether the current letter has been displayed n-trials back, we manipulated participants' cognitive load. We then measured social norm perception and norm-following behavior in these individuals.

Exploring how cognitive load affects specific cognitive mechanisms relevant to social norms and normative behavior could help us understand norm-following behaviors and compliance towards norms. To our knowledge, this is the first paper that explicitly looks at social norms perception and rule compliance changes using an incentivized experimental manipulation and an experimental task that directly measures norm-following behavior.

The rest of the paper is organized as follows. In Section 2 we provide a review of the literature on social norms and cognitive load. In section 3 we describe the experimental design. In section 4 we present the results. In section 5 we conclude.

2 Background

2.1 Experimental Manipulations of Cognitive Load

Our review of the existing literature focuses on the two aspects most relevant to our study: cognitive load and experimental approaches to the study of social norms. As already stated, cognitive load is an exogenous manipulation

of the demand applied to working memory. Working memory is a cognitive function responsible for temporarily keeping information available for processing. However, this cognitive function is limited in both capacity and duration (Li, 1999; Maehara and Saito, 2007). Working memory is essential for the reasoning and orientation of decision-making and behavior (Sweller, 1988; Barrouillet et al., 2007). The reason is that people store information in long-term memory after being serviced and processed by working memory.

Cognitive load implies attentional demand for task processing. It depends on two variables, the speed at which the processing task requires individual steps to be carried out and the duration of each step (Shenhav et al., 2017). For example, if the processing task involves adding digits, adding a digit every millisecond places a higher cognitive load on the system than adding another digit every two seconds. Along the same lines, the more information that is kept in working memory, the more concurrent processes become slower and prone to errors. Different theoretical approaches in psychology and in economics consider high cognitive load and their potential problems in the decision-making process.

First, cognitive load has been linked to dual-systems in decision-making. This perspective proposes that different systems of information processing prime the production of automatic behavior (system 1), and deliberate behavior (system 2). System 2 is effortful and requires high cognitive resources (Kahneman, 2011). Thus, if cognitive resources are low, effective operations may be diminished, leading to a dominance of impulsive reactions that could be in conflict with normative reasoning. In this framework, increasing cognitive load and decreasing cognitive resources can be interpreted as increasing the role of the (impulsive) system 1 in decision-making (Hofmann et al., 2009).

Our experimental manipulation results in an increase of cognitive load. We increase the cognitive load by exposing experimental participants to a demanding task before the main task. This setup has mainly been used in the context of individual decision-making. Indeed, experiments with cognitive load and risky decisions have shown that cognitive load affects decisions under uncertainty decreasing the risky outcomes of the participants (Gerhardt

et al., 2016). Another example of decision-making processes affected by cognitive load is prosociality behavior; Benjamin et al. (2013) showed that players in the dictator game were slightly selfish under cognitive load . However, Schulz et al. (2014) in another version of the dictator game, using an n-back task to generate cognitive load, found that subjects in the high cognitive load treatment chose a fair allocation more frequently. Cappelletti et al. (2011) studied the effect of cognitive load in an ultimatum game and did not find a significant impact of cognitive load on the behavior of the *proposer* or the *responders*. However, they discovered that *proposers* offered lesser money in a treatment where time pressure was increased and that *responders* were more likely to reject offers in the time pressure treatment. [1]

Finally, there is evidence that supports the idea that contextual variables limit the cognitive capacity to deal with cognitive load, Mani et al. (2013), proposed that the state of scarcity decreased mental "bandwidth" (a.k.a. cognitive resources such as working memory) and decreased subjects' cognitive capacity.[2]

2.2 Experimental Research on Social Norms

We used the notion of social norms proposed by Bicchieri and Xiao (2009) as *"the informal rules that govern behavior in groups and societies"*. Within social norms, we find normative beliefs [3] these beliefs are made up of personal normative beliefs and normative expectations. Personal normative beliefs are first-order beliefs about what should be, while normative expectations are second-order beliefs about others' personal normative beliefs (Bicchieri and

[1] Related with normative behavior there is some evidence about the role of cognitive load on honesty. The results indicate that there is an increase in honest behavior and a decrease in the capacity of lying when subjects are under a high cognitive load treatment (Van 't Veer et al., 2014; Vrij et al., 2008).

[2] Boonmanunt et al. (2020), found that living in poverty did not positively influence the desire to cheat but that a situation of current scarcity due to poor crop yields positively influenced the willingness to cheat.

[3] Also, we can find non-normative beliefs, but we will focus on non-normative beliefs since the aim of the paper is the study of normative behavior under cognitive load.

Xiao, 2009).

Although a subject is immersed in the same context that shapes their personal normative beliefs and normative expectations in the same direction, we prefer to study these concepts independently due to the possibility of "pluralistic ignorance".

This phenomenon is characterized by a minority opinion on a particular topic being taken as the general opinion or where the majority position is wrongly perceived to be the minority position, in this cases the personal normative beliefs would not be aligned with the normative expectations (Miller and McFarland, 1987).

Evidence of pluralistic ignorance has been found in beliefs about eating behavior (Park et al., 2007), alcohol consumption (Hines et al., 2002), and sexual harassment (Halbesleben, 2009)

Our social norms and norm-following behavior paradigm is based in three papers. Kimbrough and Vostroknutov (2018) proposes a incentivized novel method for measuring rule-following behavior directly. Second, Krupka and Weber (2013) proposes an incentivized matching game (KW method) designed to elicit social norms. The KW method has been widely used to study phenomena such as social preference formation, cooperation and corruption (Schram et al., 2019; Gioia, 2017).

Finally, Aycinena et al. (2022) proposes a method that allows to classify subjects into profiles according to the social acceptability of certain behaviors. In this method, participants who perceive any form of lying as unacceptable and who do not differentiate between the extent of lying (i.e., the amount of money earned from lying) are classified as having Deontists norm perception. Those who perceive social desirability differently depending on the extent of lying (i.e., social desirability decreases as the amount of money earned from lying increases) are classified as having Consequentialists perceptions.

The literature on the propensity to follow norms is small because this area is novel and has focused on methodological aspects. Besides the method proposed by Kimbrough and Vostroknutov (2018), Krupka and Weber (2013),

attempted to estimate the propensity to follow norms using dictator game choices. Another area where the emphasis has also been placed on the propensity to follow norms is whether it is genetically or culturally determined. House finds that children across different societies start following norms at a similar age, giving strength to the hypothesis that there is a universal predisposition to follow norms.

Regarding variables affecting the perception of social norms; Krysowski and Tremewan (2020) explored the role of anonymity and the "broken window effect". In addition, Bašić and Verrina (2021) find evidence that anonymity decreases willingness to pay to adhere to social norms. Joao and Benno (2012) find that academics are more likely to litter in an already disorderly department lounge. They explain that existing messiness serves as "empirical" information on social norms, influencing norm-related beliefs. Similarly, Berger and Hevenstone (2016) showed that people are less likely to punish littering in a train station when there is already rubbish around. Here too the "empirical" information implied by the visible garbage could shift beliefs about the strength of either an anti-littering norm or a norm of punishing littering.

3 Experimental Procedures

Experimental Design

The experimental design consisted of: the Cognitive Reflection Test (CRT) followed by three incentivized tasks: (1) the N-back task; (2) the Rule-following propensity task; (3) the Krupka and Weber (2013) protocol to identify social norms (normative expectations) through coordination. We also used a non-incentivized (4) variation of the KW protocol to obtaining the personal normative beliefs. We also used the NASA TLX task. At the end, we finished the experimental session with self-report measure about the cognitive load in the N-Back task, and a sociodemographic questionnaire .[4]

[4]The sessions were completed at REBEL (Rosario Experimental and Behavioral Economics Lab) using Otree (Chen et al., 2016).

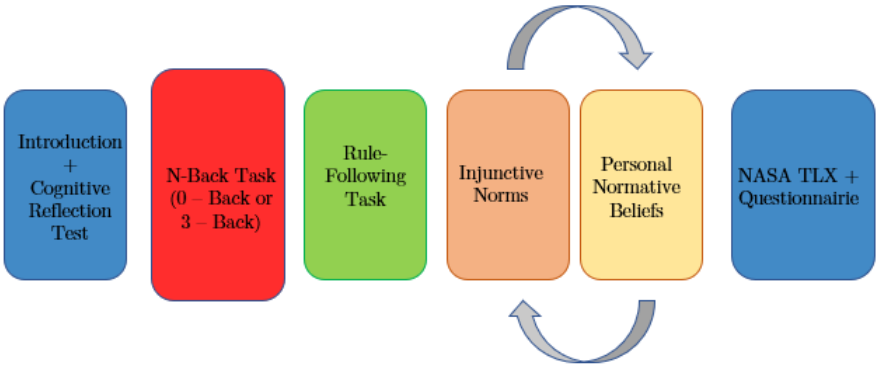


Figure 1: Experimental Design

Our identification of the effects induced by a variation in cognitive load on norm-following behavior and social-norm perception relies on the comparison of behavior for procedures 2-4 (as shown in Figure 1) following two different versions of the N-back task (1). We implement a version of the N-back task to elicit high cognitive load (henceforth, *HCL*), and a placebo version of the N-back (henceforth, *LCL*). We also varied the task order of normative expectations and personal normative beliefs. Except for this variations, the two experimental conditions were identical in all other aspects.

We used the Cognitive Reflection Test, a test designed to assess a person's proclivity to ignore an intuitive but inaccurate response and engage in additional analysis in order to arrive at the correct answer (Frederick, 2005). In this task the participants answered the three questions (see Appendix G) of the standard CRT. [5] It is well known that CRT responses are correlated with more time-consuming measures of cognitive ability (Frederick, 2005), and a

[5]The Cognitive Reflection Test took place before the cognitive load manipulation for two reasons: first, if these measure had followed the cognitive load manipulation, there could have been spillover effects because of limited cognitive resources, and second, the effect of our cognitive load manipulation might have worn off since the that part of the experiment lasted a considerable amount of time during which cognitive resources or self-control could theoretically start to replenish (Muraven and Baumeister, 2000).

better performance in heuristics-and-biases tasks (Toplak et al., 2011). Also, there is evidence about people with high cognitive ability better handling the cognitive load in risky choice situations (Brañas-Garza et al., 2019).

The N-back task followed a simple protocol: in the n-back, the subject sees a sequence of letters, and the task consists on indicating when the current stimulus matches the one from n steps earlier in the sequence for 3 rounds each one with 60 trials. Figure 2 shows the example of the instructions for both conditions. In the *HCL* condition we used a 3-back configuration (i.e., the subject has to indicate when the current letter matches with the one presented 3 steps earlier). In the *LCL* treatment we used a placebo version of the N-back (i.e., the subject has to indicate when the current letter matches with a random letter that appears on the screen). In the *LCL* condition, the subject does not need to hold the letter in their memory so there is no working memory demand. In the LCL condition the letter was the same for all the trials in a round but varied between rounds.

To incentivize the subjects' compliance with the N-Back task, the payment system was designed as follows: all the participants started with an individual endowment that decreased each time they got an incorrect response (incorrect responses included situations when subjects pressed wrong keys and when they did not press any keys). The endowment differed between treatments to account for the differences in difficulty and accuracy, and balance the average payoff between the two treatments; in the *HCL* condition, the endowment was COP 35000 ($8.6), while for *LCL*, the endowment was COP 20000 ($4.9) In both conditions, the penalty for answering wrong was COP 1000 ($ 0.24). The difference in the initial endowment was designed to ensure that payments in the HCL condition were not so low compared to subjects in the LCL condition.

Participants could get a negative payout for the N-Back task but, overall, never received fewer money than the $ 2.4 Show up Fee.

(a) LCL Condition (b) HCL Condition

Figure 2: Experimental Condition

Immediately after cognitive-load manipulation we implemented the rule-following and elicitation norms tasks. The rule-following task is used to measure the participant's willingness to comply with norms Kimbrough and Vostroknutov (2018). In this task, subjects have to drag-and-drop 50 balls one by one into two buckets: yellow or blue (figure 3 shows shows what the two buckets look like.). For each ball in the yellow bucket, they receive COP 200 ($ 0,056) and for each ball in the blue bucket, they receive COP 100 ($ 0,028.). There is a explicit rule that states that the participants have to drop the balls in the blue bucket. The amount generated by the distribution of balls in the buckets will be added to the total payment of each participant. The idea behind this task is that subjects' willingness to follow a rule given by a experimenter at some cost provides a measure of rule-following propensity.

Figure 3: adapted from Kimbrough and Vostroknutov (2018)

To measure normative expectations and personal normative beliefs, we used the norms elicitation protocol proposed by Krupka and Weber (2013) (which we refer to as KW protocol). We used first and second party situations, using as an example the worst possible outcome from the dice task proposed by Fischbacher and Föllmi-Heusi (2013).

In the first moment, participants were presented with a situation that was an example of the dice task proposed by Fischbacher and Föllmi-Heusi (2013). In this task, participants had to roll a die and privately report the number obtained to receive a payment. The payment they received depended on the number reported and not on the number rolled by the participants. [6]

[6]In the original task, the payments increased with the number of heads on the die, i.e., if one was reported, the participant received 1UM, if two were reported, the participant received 2UM, and so on up to number 5. If the participants reported a roll of 6, they would receive a payment of 0 MU. We modified the description of the payment scheme of the task so that reporting a number one would receive 0 MU and reporting a number 6 would receive 5 MU.

To elicit normative expectations we used the KW protocol. We elicited participants' perceived social acceptability of reporting the truth and each conceivable payoff-increasing lie for each of the five possible die rolls that lead to non-maximal rewards. Participants judged the social acceptability of stating the truth (i.e., the zero-earning die roll of one) and dishonestly reporting each of the payoff-increasing numbers after first considering a die roll of the zero-earning one (i.e., two, three, four, five and six). We then asked for the same judgments but in scenarios when an advantageous lie is available (die roles of two, three, four, five).

Participants rated the social appropriateness on a four-point scale ranging from "very socially inappropriate" to "very socially appropriate". The participants were incentivized to choose the social appropriateness rating that the majority of the other participants chose in their session.

At the end of the experiment, one item was randomly selected. If the rating of that particular scenario was equal to the chosen by most participants in the session, the subject earned COP 10000 ($ 2.5), which was added to their total payment.

The same procedure was used to elicit personal normative beliefs (PNB). However, instead of asking subjects to coordinate their response with all participants in the session, we asked them to rated the social appropriateness of each possible scenario according to their personal opinion .[7] Unlike the KW protocol, for this part, we gave subjects a fixed payment of 5000 that was added to their total payment (to see the complete instructions of this part go Appendix section D).

At the end of the experiment, subjects learned about their payoffs resulting from all parts of the experiment. We asked them to complete a short questionnaire concerning demographics. We also asked participants to complete the NASA TLX self-report (Hart and Staveland, 1988) to obtain a supplementary

[7] In the PNB elicitation we change the KW coordination instructions for the next paragraph: "Your objective is to evaluate how appropriate or inappropriate Individual A's behavior is in the situation explained on the next page. ***When you are finished, you will receive a fixed payment of COP 5.000 for answering this part of the activity***.

cognitive load measure.

Procedures

We completed 12 experimental sessions: 6 sessions for the HCL condition, with a total of 105 subjects and 6 sessions for the LCL, with a total of 103 subjects during the month o November 2021 at Universidad del Rosario's Experimental and Behavioral Economics Laboratory, REBEL. Subjects were mainly undergraduate students from different majors, which were recruited using ORSEE Greiner (2004), the online recruitment platform . Subjects received an average payment of COP 40800 ($10) including the COP 10000 ($ 2.5) show up fee. The average payment for the subjects in the *LCL* condition was COP 45100 ($ 11) and the average payment for the subjects on the *HCL* condition was COP 35500 ($ 8.72)

Descriptive Statistics

Table 1: Descriptive statistics

	(1) Low Cognitive Load	(2) High Cognitive Load	(3) Difference
Is Female	0.537	0.429	0.108
	(0.048)	(0.049)	
Age	21.222	21.267	-0.044
	(0.228)	(0.209)	
Econ Related	0.472	0.371	0.101
	(0.048)	(0.047)	
CRT Score (Normal Score)	0.420	0.333	0.086
	(0.039)	(0.036)	
CRT Score (Intuitive)	0.685	0.778	-0.093
	(0.043)	(0.038)	
Observations	108	105	

Notes: Column (3) presents the difference associated to a t-test performed to check balance between the subjects in the *LCL* condition and the *HCL* condition. P values *** p <0.01, ** p <0.05, * p <0.1

Summary statistics are presented in Table 1. Subjects in the *LCL* condition were 53 % female and 42 % the *HCL*. For both groups their mean age is 21.2. The participants have a score of 0.42/1 in the *LCL* condition and 0.33/1 in the *HCL* condition. The results of the descriptive statistics table show that there is a balance among the participants in each sample.

4 Results

4.1 Cognitive Load Treatment Effectiveness

The aim of this research study is to analyze the effects of cognitive load on social norms perceptions and rule-following propensity. Before focusing on these results, we checked whether our HCL treatment was successful at increasing cognitive load.

To provide evidence on the effect of cognitive load, we focused on two measures for which there is evidence that increased cognitive load should have an impact (response time and performance) and one subjective measure through self report (NASA TLX). Research has shown that subjects in a high cognitive load condition have significantly lower performance on verbal and nonverbal recognition tasks (Paas, 1992; Siegle et al., 2008; Head and Helton, 2014). In addition, there is evidence that increased cognitive load increases response time duration (Chiu et al., 2019). Finally, we focused on subjective measures obtained through a self-report scale of perceived cognitive load.

Regression Results on Treatment Effect

Table 2 presents the results of a panel analysis on the variables of performance and response time in milliseconds in the N-Back task, these results will be explained in the respective sections, but at a glance, they show that participants in the *HCL* condition had higher response times and worse performance than those in the *LCL* condition.

Table 2: Analysis for Cognitive Load Treatment Effectiveness

	(1) Correct	(2) Correct	(3) Milliseconds	(4) Milliseconds
Treatment	-0.437***	-0.432***	286.8***	282.5***
	(0.0177)	(0.0178)	(10.63)	(10.87)
Round = 2		-0.0020		-6.605
		(0.0054)		(16.07)
Round = 3		0.0026		(16.07)
		(0.0040)		(14.94)
Tratamiento x Round = 2	0.0485**	0.048**	17.66	17.59
	(0.023)	(0.023)	(14.06)	(14.53)
Tratamiento x Round = 3	0.0850***	0.085***	21.63	22.35
	(0.0257)	(0.0257)	(15.20)	(15.57)
Is Female		-0.010***		-12.28***
		(0.0033)		(4.735)
Econ Related		0.019***		11.88**
		(0.0034)		(4.889)
CRT- Normal Score		0.056***		-36.15***
		(0.0061)		(8.689)
Constant	0.987***	0.953***	594.4***	631.8***
	(0.0049)	(0.0056)	(2.498)	(13.25)
Observations	33,478	33,478	33,478	33,478
Number of trials	180	180	180	180
Sociodemograpic Controls		✓		✓
R-squared	0.113	0.107	0.113	0.107

Notes This table shows results from a Panel Analysis on the Effectiveness of the N-Back Task. The dependent variable is the correctness of the responses and the time responses on milliseconds for the 180 Trials of the N-Back Task. We consider a set of *Sociodemographic controls* includes age, gender, and a dummy variable that takes value 1 for those who study a career related to economics and the Cognitive Reflection Test Scores. Robust standard errors in parentheses *** p <0.01, ** p <0.05, * p <0.1

Performance

Figure 4 shows box plots for the proportion of correct responses for both treatments in each of the n-back rounds.

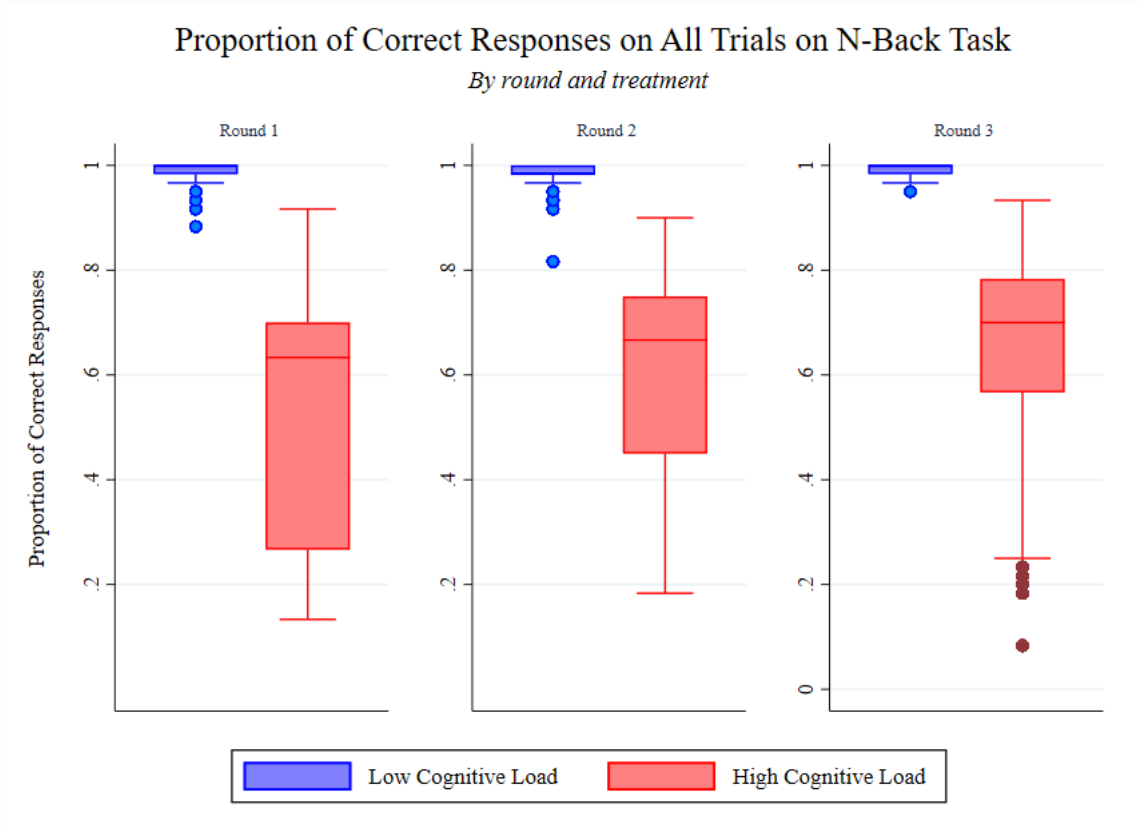


Figure 4: Performance on N-Back Task

Subjects in the LCL condition maintain their performance to 100% correct across all rounds (i.e., almost all the 60 trials of each round were correct). The columns (1) and (2) from Table 2 shows that Subjects in the HCL condition had on average 43.2% fewer correct answers compared to subjects in the LCL condition. Interestingly, we observed that in the second and third round there is positive effect of the number of correct answers when interacted with the treatment suggesting that there was a improvement effect as the number of rounds increased.

Response Time

The Figure 5 shows that subjects on the *HCL* condition have higher responses times. The columns (3) and (4) on Table 2 shows that subjects on the *HCL* have higher time responses by $\approx$ 300 ms. The subjects in the HCL condition had an average response time of 889 ms (SD = 595.9) while subjects in the LCL condition had a response time of 565 ms (SD = 205.9). Although there is no a significant effect as the rounds increase subjects in the HCL condition exhibited a 20ms increase between rounds. This could be explained by exhaustion, as there is previous evidence that the N-Back task with 3 Backs increases response time (Block et al., 2010).

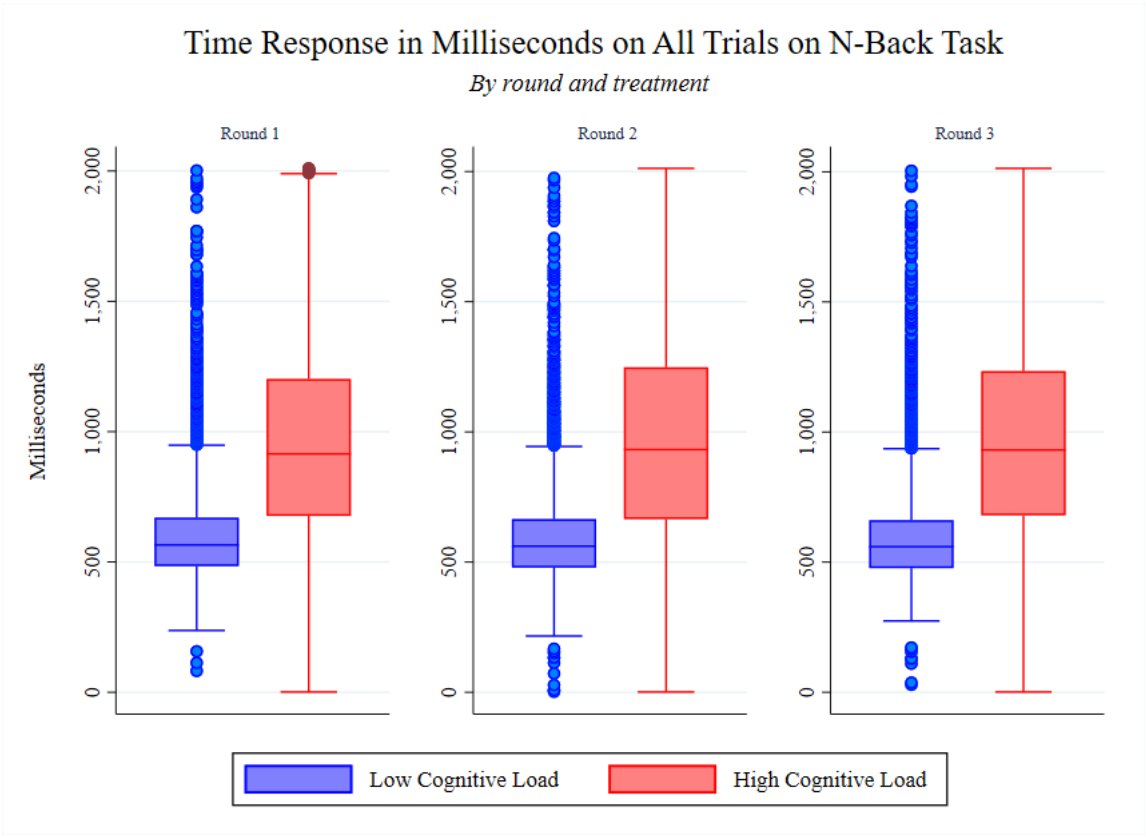
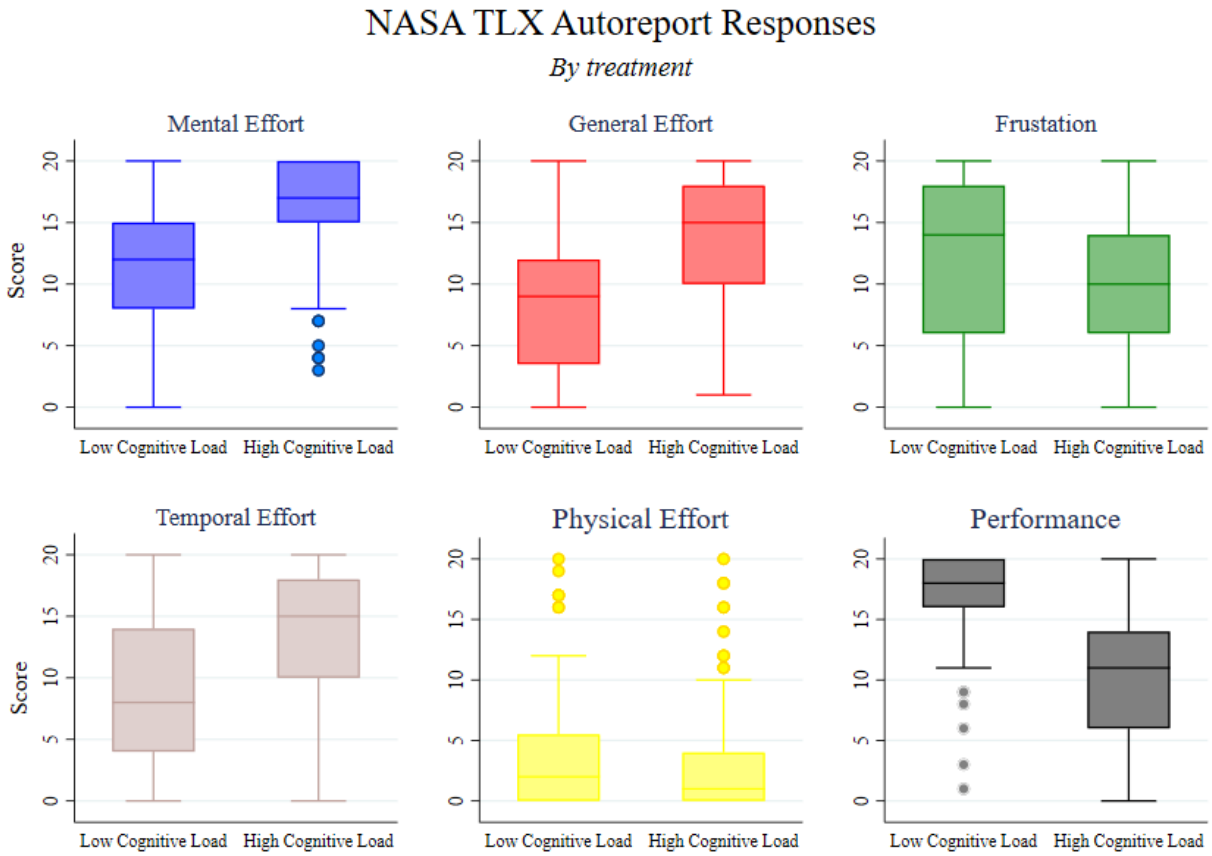


Figure 5: Response time on N-Back Task

NASA Questionnaire

Figure 4.1 presents distribution of self-reports across treatment groups of self reports along mental effort , general effort, frustration, temporal effort, physical effort and performance, we can observe that there are significant differences in almost all the questions of the self-report scale (to see the items on this self-report instrument go to section H on the Appendix). The only question of the scale where we found no significant treatment difference was the physical effort item, which was not surprising because there was no physical activity in the N-Back task. Table 11 in the Appendix quantifies the significance of these differences and shows there is a considerable effect of our treatment on the cognitive load self-report questionnaire.

These results demonstrate that the HCL condition had a strong effect on the subjective evaluation of cognitive load and support the hypotheses on the expected impact of the cognitive load manipulation.



4.2 Treatment Effects

Our primary question of interest is whether i) propensity of rule-following behavior, ii) normative expectations, and iii) personal normative beliefs are affected by high cognitive load. Formally, equation (4.1) shows the estimated model.

$$Y_i = \beta_1 HCLi + \beta_2 Female_i + \beta_3 CA_i + \beta_4 Econ_i + \varepsilon_i \tag{4.1}$$

Where Y_i is the outcome for individual i. $HCLi$ is the treatment variable that takes a value of one if the individual i was treated in the session and zero otherwise. $Female_i$ is a dummy for gender, CA_i is the Cognitive Reflection

Test result, $Econ_i$ is dummy for whether the undergraduate major was in Economics or Finance, and ε_i is an error term.

In addition, as a robustness checkness of our treatment condition, we run the next specification with the NASA TLX questionnaire scores:

$$\overline{Y_i} = \theta_1 NASAi + \theta_2 Female_i + \theta_3 CA_i + \theta_4 Econ_i + \varepsilon_i \tag{4.2}$$

Where $\overline{Y_i}$ is the outcome for individual i. $NASAi$ is the NASA TLX scores that goes from 0 to 20, where 0 is no effect on the particular certain variable and 20 is the highest score in that certain variable. $Female_i$ is a dummy for gender, CA_i is the Cognitive Reflection Test result, $Econ_i$ is dummy for whether the undergraduate major was in Economics or Finance, and ε_i is an error term.

Rule Following Propensity

Hypothesis 1 (H1) Rule-following propensity will be lower in the *HCL* condition compared to the *LCL* condition.

In line with this hypothesis, we expect participants in the *HCL* treatment group to experience self-control depletion, which would make it harder or them to follow norms.

Figure 6 shows the distributions subjects in both *LCL* and *HCL* conditions according to their level of rule-following behavior (proportion of balls in the blue bucket). Both distributions have point masses at full rule-following and full rule-violation. We performed a Kolmogorov-Smirnov test to compare the ball distributions between the two treatments and found no significant differences between the two distributions (*p-value* = 0.449).

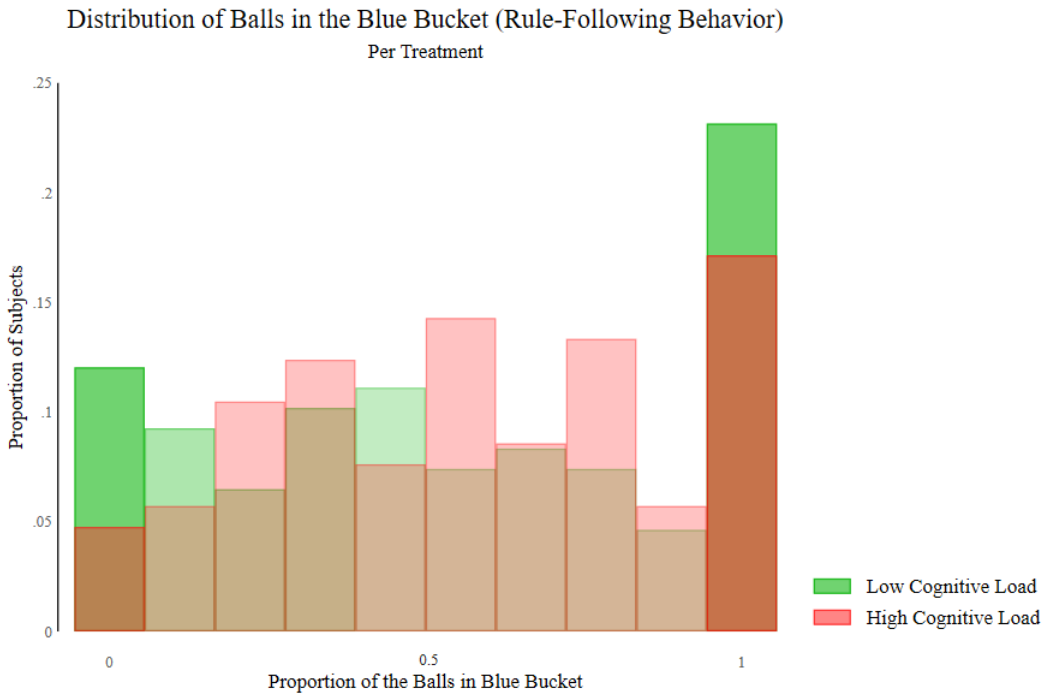


Figure 6: Distribution of balls between Experimental Conditions

Table 3 shows no significant effect of the *HCL* condition on the propensity to follow rules. After observing the behavior of the distribution of balls between the two buckets, we decided to propose a series of exploratory analyses reported en columns 3, 4, 5 and 6 of table 3 that would allow us to understand other relevant levels of propensity to follow the rules.

Table 3: OLS on Rule Compliance

	(1)	(2)	(3)	(4)	(5)	(6)
	Rule-violation	Rule-violation	Complete Rule-following	Complete Rule-following	Complete Rule-violation	Complete Rule-violation
Treatment	2.039	1.379	-0.215	-0.202	-0.495*	-0.450*
	(2.331)	(2.343)	(0.197)	(0.198)	(0.262)	(0.269)
Is Female		-2.192		0.162		0.322
		(2.498)		(0.208)		(0.283)
Econ Related		-3.963		-0.215		0.346
		(2.475)		(0.205)		(0.273)
CRT-Normal Score		0.320		0.257		-0.0609
		(3.364)		(0.271)		(0.393)
Buckets Order		-2.151		-0.0956		0.0865
		(2.345)		(0.197)		(0.246)
Constant	27.38***	31.39***	-0.734***	-0.788***	-1.173***	-1.562***
	(1.753)	(2.680)	(0.133)	(0.223)	(0.157)	(0.312)
Observations	213	213	213	213	213	213
Sociodemographic Controls		✓		✓		
R-squared	0.004	0.025	0.00558	0.0176	0.0305	0.0613

Notes This table shows results from a OLS on the Rule Compliance on different levels on the Rule-Following Behavior Task. We consider a set of *Sociodemographic controls* includes age, gender, and a dummy variable that takes value 1 for those who study a career related to economics and the Cognitive Reflection Test Resutls. Robust standard errors in parentheses *** p <0.01, ** p <0.05, * p <0.1

We ran two Probit models: In the first one (columns 3 and 4) the dependent variable was a dummy variable that took a value of 1 when subjects deposited all balls in the blue bucket (full rule-following), and in the second model (columns 5 and 6) the dependent variable was a dummy that took a value of 1 when subjects left 0 balls in the blue bucket (full rule-violation).

For full rule-violation, we found that the *HCL* treatment decreased the predicted probability of being a full rule-breaker. That means that people in the treatment group tended to put at least one ball in the blue bucket. This goes against our hypothesis (H1) but is consistent with (Adams-Quackenbush, 2015), who propose that deviating from the norm is cognitively challenging as it implies that people must later provide explanations and also, in some cases, must maintain a "straight" story.[8] Our results and this evidence support the

[8]Also, Ströfer et al. (2016) found that in two groups in which one had an incentive to lie (not following the norm), subjects had differing skin conductance responses (SCR). Strofer

hypothesis that subjects exposed to the *HCL* condition and who consequently experience increased cognitive load prefer to follow the norm to avoid the additional cost of deviating from it.

Table 4: OLS on Extreme Rule Behavior

	(1) Extreme Values	(2) Extreme Values
Treatment	-0.133**	-0.114*
	(0.0615)	(0.0620)
Is Female		0.0984
		(0.0659)
Econ Related		-0.00234
		(0.0646)
CRT-Cognitive Score		-0.0384
		(0.122)
Buckets Order		-0.00684
		(0.0628)
Constant	0.352***	0.407***
	(0.0462)	(0.127)
Observations	213	213
Sociodemographic Controls		✓
R-squared	0.022	0.045

Notes This table shows results from a OLS on the Extreme Rule Behavior on the Rule-Following Behavior Task. The dependent variable is a dummy of 1 when there is 0 or 50 balls on the blue bucket and 0 otherwise. We consider a set of *Sociodemographic controls* includes age, gender, and a dummy variable that takes value 1 for those who study a career related to economics and the Cognitive Reflection Test Scores. Robust standard errors in parentheses *** p <0.01, ** p <0.05, * p <0.1

Table 4 show the analysis of the effect of cognitive load on the distribution of blue balls in normative extreme behavior. For this purpose we created a dummy that took a value of 1 when the number of balls in the blue bucket

proposed that not following the rules generates higher arousal levels as measured by SCR (and associated to higher levels of activity in the sympathetic nervous system).

was 0 or 50, and a value of 0 otherwise. In this case we found that people in the HCL condition were 13% less likely to have extreme behaviors. This result is quite interesting since there is not much evidence in this direction. Westbrook and Braver (2015) proposed that increasing cognitive load through tasks that deplete self-control is related to changes in the salience of certain personality traits.[9] For example in the rule-following propensity task, a person who reports high self-control will have cognitive exertion through mental effort and become less self-controlled so will prefer to distribute at least one ball in the yellow bucket (the bucket that gives the highest expected utility) while a person who reports low self-control will prefer to leave at least one ball in the blue bucket to avoid the "fear of being judged".

Social Norms

Hypothesis 2 (H2) We expect for social norms perceived by the participants assigned to the *HCL* condition to be less severe. This means that subjects in the HCL condition during the Krupka-Webber protocol will tend to be more lax in rating as negative those behaviors that deviate from the "truth."

Our hypothesis was that the perception of social norms would differ between participants in the HCL condition and those in the LCL condition. In order to test it, we classified the subjects following the method proposed by Aycinena et al. (2022). (For more detail about the Algorithm of classification see Appendix section I).

Normative Expectations Elicitation

The figure 7 show the results of the algorithm of classification for the Normative Expectations, in the *HCL* we classified 51% of the HCL subjects as Consequentialist, 31% as Deontic. Also we classified 10 % as normative egoists (i.e., they perceive injunctive norms such that it is more acceptable

[9]This means that certain traits may become salient but the reference point of the change is in the measure of the trait before to the experimental manipulation. This theory could explain the mixed results in the literature about the effect of lack of self-control over unethical behavioral and prosociality (Drolet and Frances Luce, 2004)

to lie than tell the truth). In the other hand in the *LCL* we classified 55% of our subjects as Consequentialist , 27% as Deontic . Also we classified 7 % as normative egoists.

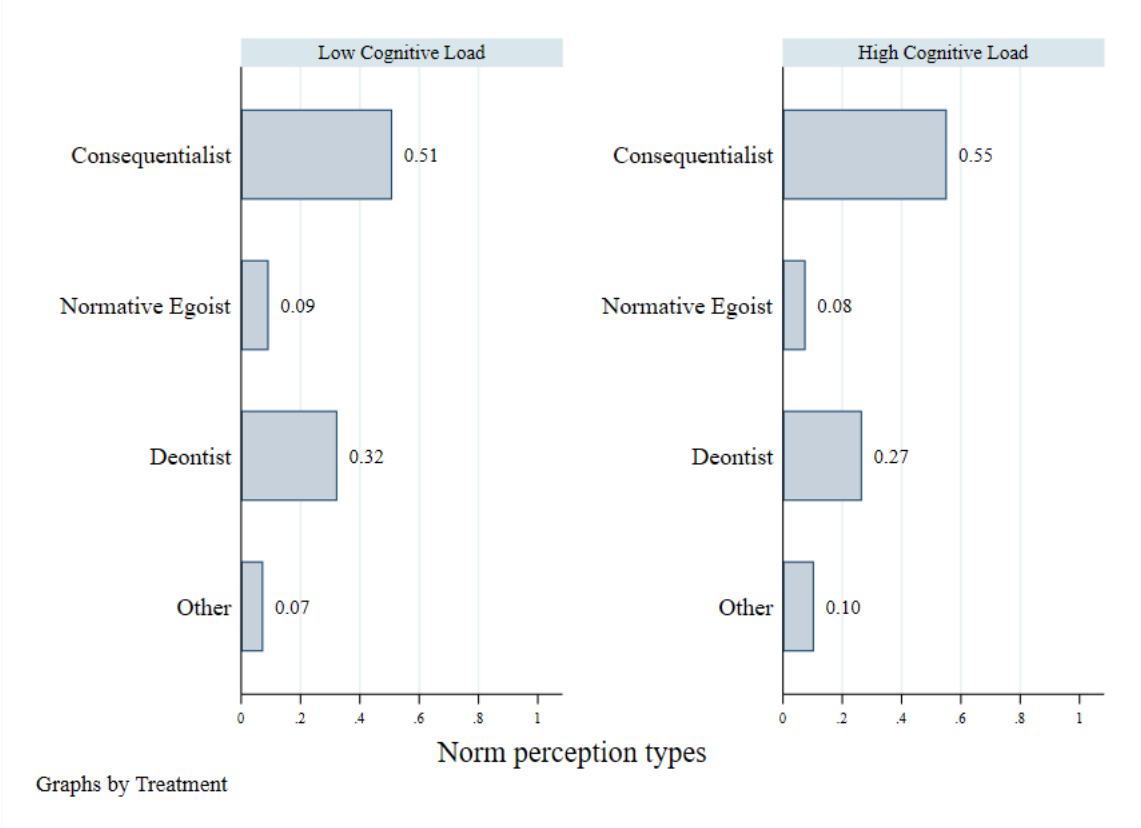


Figure 7: Figure

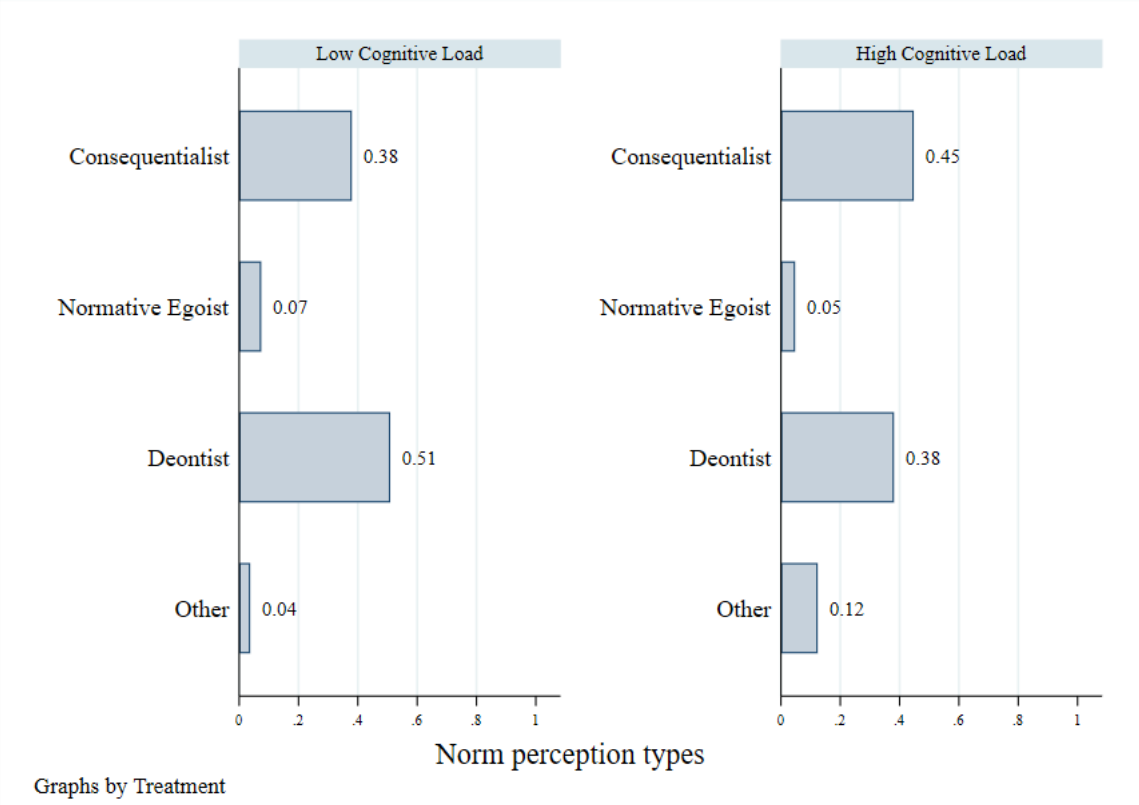
Table 5 shows no significant differences between the two experimental conditions: An increase in cognitive load did not have a significant effect on how people's normative expectations are rated.

Table 5: OLS on the Norm Perception Type (Normative Expectations)

	(1) Consequentialist	(2) Consequentialist	(3) Consequentialist	(4) Deontist	(5) Deontist	(6) Deontist	(7) Other	(8) Other	(9) Other
Treatment	0.0431	0.0470	0.0513	-0.0574	-0.0471	-0.0419	0.0307	0.0248	0.0137
	(0.0687)	(0.0678)	(0.0683)	(0.0627)	(0.0545)	(0.0551)	(0.0393)	(0.0350)	(0.0344)
MSA of Dishonesty		-0.156***	-0.148***		-0.418***	-0.411***		0.236***	0.222***
		(0.0549)	(0.0566)		(0.0427)	(0.0442)		(0.0510)	(0.0498)
Is Female			0.0156			-0.00473			-0.0443
			(0.0723)			(0.0580)			(0.0359)
Econ Related			-0.0899			0.113*			-0.0769**
			(0.0718)			(0.0602)			(0.0321)
CRT-Cognitive Score			0.151			-0.0956			0.0359
			(0.0963)			(0.0769)			(0.0483)
Order Effect			0.0230			-0.0536			0.0407
			(0.0685)			(0.0548)			(0.0353)
Constant	0.509***	0.433***	0.397***	0.324***	0.121***	0.138**	0.0741***	0.189***	0.208***
	(0.0483)	(0.0505)	(0.0754)	(0.0452)	(0.0372)	(0.0588)	(0.0253)	(0.0429)	(0.0496)
Observations	213	213	213	213	213	213	213	213	213
Sociodemographic Controls			✓			✓			✓
R-squared	0.002	0.031	0.047	0.004	0.252	0.270	0.003	0.206	0.233

Notes This table shows results from OLS regressions on the Normative Expectations Types. We consider a set of *Sociodemographic controls* includes age, gender, and a dummy variable that takes value 1 for those who study a career related to economics, the Cognitive Reflection Test Scores, and a dummy for the order of the normative belief tasks that took the value of 1 when the normative expectations task came first.. Robust standard errors in parentheses *** p <0.01, ** p <0.05, * p <0.1

Personal Normative Beliefs



The figure 4.2 show the results of the algorithm of classification for the Personal Normatives Beliefs, in the *HCL* we classified 45% of the subjects as Consequentialist, 38% as Deontic. Also, we classified 7 % as normative egoists. In the other hand in the *LCL* we classified 51% as Consequentialist, 38% as Deontic . Finally, we classified 4 % as Normative Egoists.

Table 6 shows that there is an effect of *HCL* on the distribution of the types for the personal normative beliefs perceptions.

The columns (7) ,(8) and (9) shown that there is a higher probability of being in the Other category (i.e. subjects who have irregular behaviors or answer the same in all response options) in subjects exposed to the high cognitive load condition.

Also, the column (4) shown that there is a significant effect on the Deontic

category of norm perception. This negative effect means that Deontic subjects have lower probability of been found in the treatment group. These result is in line with the findings in Table 4, where subjects in the high cognitive load treatment tend to have less extreme distributions on the Rule Following Propensity Task.

result is in line with what was proposed in H2, which states that subjects in the high cognitive load treatment will tend to be laxer (e.g., not rating all degrees of lying as a very socially unacceptable but evaluating them according to a degree of severity of the lie) with their social norms perceptions. (To see the results for the 4 categories on the Personal Normative Beliefs see Table 10 on Appendix)

Table 6: OLS on the Personal Normative Beliefs

	(1) Consequentialist	(2) Consequentialist	(3) Consequentialist	(4) Deontist	(5) Deontist	(6) Deontist	(7) Other	(8) Other	(9) Other
Treatment	0.0680	0.0756	0.0764	-0.128*	-0.0857	-0.0843	0.0868**	0.0615**	0.0643**
	(0.0677)	(0.0679)	(0.0681)	(0.0678)	(0.0590)	(0.0597)	(0.0371)	(0.0303)	(0.0310)
MSA of dishonesty		-0.0847*	-0.0675		-0.474***	-0.487***		0.281***	0.281***
		(0.0504)	(0.0532)		(0.0397)	(0.0427)		(0.0545)	(0.0549)
Is Female			-0.0192			0.0257			-0.0286
			(0.0721)			(0.0617)			(0.0282)
Econ Related			0.116			-0.0953			0.0162
			(0.0736)			(0.0627)			(0.0313)
CRT- Score			0.00176			0.00759			0.0318
			(0.0943)			(0.0797)			(0.0373)
Order Effect			0.143**			-0.124**			-0.0284
			(0.0674)			(0.0587)			(0.0306)
Constant	0.380***	0.325***	0.225***	0.509***	0.206***	0.283***	0.0370**	0.217***	0.225***
	(0.0469)	(0.0553)	(0.0721)	(0.0483)	(0.0443)	(0.0629)	(0.0183)	(0.0481)	(0.0548)
Observations	213	213	213	213	213	213	213	213	213
Demograpic Controls			✓			✓			✓
R-squared	0.005	0.013	0.047	0.017	0.269	0.293	0.026	0.324	0.332

Notes This table shows results from OLS regressions on the Social Norms Perception Types. We consider a set of *Sociodemographic controls* includes age, gender, and a dummy variable that takes value 1 for those who study a career related to economics, the Cognitive Reflection Test Scores and, a dummy for the order of the normative belief tasks that took the value of 1 when the normative expectations task came first. Robust standard errors in parentheses *** p <0.01, ** p <0.05, * p <0.1

Besides the effect of cognitive load on Other and Deontic categories of norm perception, subjects behaved similarly for normative expectations and normative personal preferences. The Table 5 and Table 6 shows a effect of the Mean Social Acceptability of Dishonesty (MSA) on the classification of Deontic subjects. This result aligns with the classification algorithm that proposes

that Deontic subjects would classify any lying as socially unacceptable.

An unexpected result was found in the column (3) and (6) on both Tables. We see a significant effect on the order of presentation of the tasks over the number of subjects classified in the Deontic category. We believe there is a psychological mechanism behind this result, but a deeper analysis is needed because we cannot explain this effect with the collected information.

Robustness checkness

To explore whether self-reported cognitive load affects behavior, we ran the specification (4.2) where NASA TLX is used as the independent variable.

We hypothesize that self-report may be a better proxy for cognitive load since we know that there are individual variables that affect the impact of cognitive load over performance.

Thus, we could have people who, even though they were assigned to the *HCL* had no significant effect (low self-report of general effort and low mental effort) and people in the *LCL* who had a significant effect (high self-report of general effort and high mental effort).

The results in table 7 go in the same direction as those found in the table 3 and the table 4, reporting higher cognitive load is related to a decrease in the probability of breaking the rules completely and having extreme behaviors, in both cases the significance is maintained but the probability increases.

Table 7: OLS and Probit on Rule-Following Propensity Task

	(1) Complete Rule-following	(2) Complete Rule-following	(3) Complete Rule-violation	(4) Complete Rule-violation	(5) Extreme Behavior	(6) Extreme Behavior
Overal Effort	-0.411	-0.343	-0.923*	-0.895*	-0.753*	-0.681*
	(0.421)	(0.420)	(0.523)	(0.533)	(0.401)	(0.400)
Mental Effort	-0.0976	-0.129	0.928	1.361**	0.325	0.441
	(0.468)	(0.482)	(0.598)	(0.605)	(0.442)	(0.456)
Is Female		0.173		0.392		0.308
		(0.209)		(0.281)		(0.196)
Econ Related		-0.218		0.470*		0.0222
		(0.211)		(0.259)		(0.196)
CRT-Cognitive Score		0.218		-0.747		-0.150
		(0.380)		(0.540)		(0.367)
CRT-Intuitive Score		0.00150		-0.945**		-0.396
		(0.329)		(0.467)		(0.322)
Buckets Order		-0.0798		0.189		-0.00415
		(0.202)		(0.260)		(0.190)
Constant	-0.548**	-0.610	-1.547***	-1.488**	-0.384	-0.327
	(0.266)	(0.460)	(0.412)	(0.670)	(0.259)	(0.444)
Observations	213	213	213	213	213	213
Sociodemograpic Controls		✓		✓		✓
Pseudo R2	0.00896	0.0198	0.0259	0.102	0.0147	0.0355

Notes This table shows results from a Probit on the Extreme Rule Behavio, Complete Rule-Following and Complete Rule-violation. The dependent variables are dummy of 1 when there is 0 or 50 balls on the blue bucket and 0 otherwise.We consider a set of *Sociodemographic controls* includes age, gender, and a dummy variable that takes value 1 for those who study a career related to economics and the Cognitive Reflection Test Scores. Robust standard errors in parentheses *** p <0.01, ** p <0.05, * p <0.1

The table 8 shows that unlike the table 7 the significance of the effect on the perception of personal normative beliefs are null. [10]

Table 8: OLS on Personal Normative Beliefs

	(1) Consecuensialist	(2) Consecuensialist	(3) Consecuensialist	(4) Deontist	(5) Deontist	(6) Deontist	(7) Other	(8) Other	(9) Other
Overall Effort	0.0650	0.0741	0.0677	-0.229	-0.174	-0.167	0.0669	0.0343	0.0358
	(0.148)	(0.148)	(0.147)	(0.152)	(0.136)	(0.135)	(0.0855)	(0.0645)	(0.0670)
General Effort	-0.0508	-0.0549	-0.0161	0.151	0.126	0.0971	0.0324	0.0471	0.0580
	(0.159)	(0.159)	(0.159)	(0.169)	(0.150)	(0.149)	(0.0920)	(0.0711)	(0.0723)
MSA		-0.0801	-0.0635		-0.478***	-0.490***		0.285***	0.286***
		(0.0501)	(0.0530)		(0.0387)	(0.0417)		(0.0553)	(0.0555)
Is Female			-0.0229			0.0278			-0.0320
			(0.0724)			(0.0619)			(0.0289)
Econ Related			0.111			-0.0876			0.0175
			(0.0750)			(0.0632)			(0.0315)
CRT-Cognitive Score			0.00312			0.00252			0.0378
			(0.0977)			(0.0825)			(0.0385)
Order Effect			0.148**			-0.129**			-0.0246
			(0.0676)			(0.0585)			(0.0305)
Constant	0.413***	0.363***	0.240**	0.467***	0.169*	0.264**	0.0204	0.198***	0.196***
	(0.0957)	(0.0981)	(0.121)	(0.0981)	(0.0876)	(0.109)	(0.0413)	(0.0610)	(0.0696)
Observations	213	213	213	213	213	213	213	213	213
Sociodemographic Controls			✓			✓			✓
R-squared	0.001	0.008	0.042	0.011	0.268	0.292	0.009	0.317	0.325

Notes This table shows results from OLS regressions to check robustness on the Normative Expectations results. We consider a set of *Sociodemographic controls* includes age, gender, and a dummy variable that takes value 1 for those who study a career related to economics and the Cognitive Reflection Test Scores. Robust standard errors in parentheses *** p <0.01, ** p <0.05, * p <0.1

5 Conclusion

This paper studies the effect of cognitive load on social norms. It is an attempt to advance our understanding of the mechanisms affecting how individuals perceive norms and their rule-following propensity. Additionally, we looked at the formation of normative expectations and personal normative beliefs.

We found a negative effect of the high cognitive load condition on the propensity to follow the rules (1) in the extreme behaviors (following the rule totally or breaking the rule totally) and (2) on the full-rule violation, although this last result is weak and just marginally significant.

[10] We also performed this exercise for the normative expectations and the results differ with the ones reported in 5, the table is found in the Appendix table 12.

Regarding (1) there is evidence that relates high cognitive load with changes in behavior, which is why the subjects had more conservative behaviors on the distribution of the balls. The result (2) goes against most of the literature that proposes that increased cognitive load should dis-inhibit self-control; we hypothesize that deviating from the norm is costly. Since *HCL* subjects are tired, they prefer to adhere to the rule. [11]

Concerning social norms, we find (3) a significant effect for the Other category (i.e., subjects who choose random or flat choices) and a marginal significant result for the Deontic category in the personal normative beliefs rating ("what I think is right") and (4) a null effect on normative expectations.

We believe that some of the limitations of this study may be the statistical power of the sample as we do not have a large enough number of observations and the lack of a within-subjects design that would allow us to compare whether there are substantial changes in the same subject between the two conditions. This would allow us to understand if, indeed, the direction of the effect of cognitive load on social norms is mediated by individual characteristics; in other words, not everyone should be inhibited by high cognitive load.

Also another of our concerns is the duration of the effect of cognitive load during the experiment; for this reason, we included an order dummy that allows us to control for the order of appearance of the social norms perception tasks. Finally, we believe that it is necessary to conduct an experiment using a dual method where we implement a cognitive load task immediately before each task to ensure that the effect is homogeneous across all tasks.

Finally, we believe this is a step forward in analyses of the effect of cognitive load over other normative behavior. It provides a dual framework for understanding rule-following behavior. In addition, it is necessary to complement this type of research with tools that allow us to capture the underlying processes behind deciding to follow or not to follow a rule. We believe that

[11] The data we collected seem to support this hypothesis, although we do not have sufficient information. We believe that the difference in the cognitive costs of breaking a rule completely or partially should be further explored.

using devices such as electrophysiological measures and eye trackers to obtain measures of brain activity, arousal and pupil size can shed better light on the underlying cognitive process of the rule-following propensity.

References

Adams-Quackenbush, N. M. (2015). The effects of cognitive load and lying types on deception cues.

Allcott, H. (2009). Social Norms and Energy Conservation. *Massachusetts Institute of Technology, Center for Energy and Environmental Policy Research, Working Papers*, 95.

Aycinena, D., Rentschler, L., Beranek, B., and Schulz, J. (2022). Social Norms and Dishonesty across Societies. *(forthcoming) Proceedings of the National Academy of Sciences*.

Barrouillet, P., Bernardin, S., Portrat, S., Vergauwe, E., and Camos, V. (2007). Time and cognitive load in working memory. *Journal of Experimental Psychology. Learning, Memory, and Cognition*, 33(3):570–585.

Bašić, Z. and Verrina, E. (2021). Personal Norms — and Not Only Social Norms — Shape Economic Behavior. SSRN Scholarly Paper 3720539, Social Science Research Network, Rochester, NY.

Benjamin, D. J., Brown, S. A., and Shapiro, J. M. (2013). Who Is 'Behavioral'? Cognitive Ability and Anomalous Preferences. *Journal of the European Economic Association*, 11(6):1231–1255.

Berger, J. and Hevenstone, D. (2016). Norm enforcement in the city revisited: An international field experiment of altruistic punishment, norm maintenance, and broken windows. *Rationality and society*, 28(3):299–319.

Beshears, J., J. Choi, J., Laibson, D., Madrian, B. C., and Milkman, K. L. (2015). The Effect of Providing Peer Information on Retirement Savings Decisions". *Journal of Finance*, 70(3):1161–1201.

Bicchieri, C. and Xiao, E. (2009). Do the right thing: but only if others do so. *Journal of Behavioral Decision Making*, 22(2):191–208.

Block, R. A., Hancock, P. A., and Zakay, D. (2010). How cognitive load affects duration judgments: A meta-analytic review. *Acta Psychologica*, 134(3):330–343.

Bogliacino, F. and Montealegre, F. (2020). Do Negative Economic Shocks Affect Cognitive Function, Adherence to Social Norms and Loss Aversion? Technical report, Center for Open Science.

Boonmanunt, S., Kajackaite, A., and Meier, S. (2020). Does poverty negate the impact of social norms on cheating? *Games and Economic Behavior*, 124:569–578.

Brañas-Garza, P., Kujal, P., and Lenkei, B. (2019). Cognitive reflection test: Whom, how, when. *Journal of Behavioral and Experimental Economics*, 82:101455.

Cappelletti, D., Güth, W., and Ploner, M. (2011). Being of two minds: Ultimatum offers under cognitive constraints. *Journal of Economic Psychology*, 32(6):940–950.

Chen, D. L., Schonger, M., and Wickens, C. (2016). oTree—An open-source platform for laboratory, online, and field experiments. *Journal of Behavioral and Experimental Finance*, 9:88–97.

Chiu, F., Rakusen, L. L., and Mattys, S. L. (2019). Cognitive load elevates discrimination thresholds of duration, intensity, and f0 for a synthesized vowel. *The Journal of the Acoustical Society of America*, 146(2):1077–1084. Publisher: Acoustical Society of America.

Deck, C. and Jahedi, S. (2015). The effect of cognitive load on economic decision making: A survey and new experiments. *European Economic Review*, 78(C):97–119.

Drolet, A. and Frances Luce, M. (2004). The Rationalizing Effects of Cognitive Load on Emotion-Based Trade-off Avoidance. *Journal of Consumer Research*, 31(1):63–77.

Faulkner, K. A., Redfern, M. S., Cauley, J. A., Landsittel, D. P., Studenski, S. A., Rosano, C., Simonsick, E. M., Harris, T. B., Shorr, R. I., Ayonayon, H. N., Newman, A. B., and for the Health, Aging, and Body Composition Study (2007). Multitasking: Association Between Poorer Performance and a History of Recurrent Falls. *Journal of the American Geriatrics Society*, 55(4):570–576. _eprint: https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1532-5415.2007.01147.x.

Fischbacher, U. and Föllmi-Heusi, F. (2013). Lies in Disguise—An Experimental Study on Cheating. *Journal of the European Economic Association*, 11(3):525–547.

Frederick, S. (2005). Cognitive Reflection and Decision Making. *Journal of Economic Perspectives*, 19(4):25–42.

Gailliot, M. T., Gitter, S. A., Baker, M. D., and Baumeister, R. F. (2012). Breaking the rules: Low trait or state self-control increases social norm violations. *Psychology*, 3(12):1074–1083.

Gaube, S., Tsivrikos, D., Dollinger, D., and Lermer, E. (2018). How a smiley protects health: A pilot intervention to improve hand hygiene in hospitals by activating injunctive norms through emoticons. *PLOS ONE*, 13(5):e0197465.

Gerhardt, H., Biele, G. P., Heekeren, H. R., and Uhlig, H. (2016). Cognitive load increases risk aversion. SFB 649 Discussion Paper 2016-011, SFB 649, Economic Risk, Berlin.

Gioia, F. (2017). Peer effects on risk behaviour: the importance of group identity. *Experimental Economics*, 20(1):100–129.

Greiner, B. (2004). An Online Recruitment System for Economic Experiments. Pages: 79-93 Volume: 63.

Gross, J. and De Dreu, C. K. W. (2021). Rule Following Mitigates Collaborative Cheating and Facilitates the Spreading of Honesty Within Groups. *Personality and Social Psychology Bulletin*, 47(3):395–409. Publisher: SAGE Publications Inc.

Halbesleben, J. R. B. (2009). The Role of Pluralistic Ignorance in the Reporting of Sexual Harassment. *Basic and Applied Social Psychology*, 31(3):210–217. Publisher: Routledge _eprint: https://doi.org/10.1080/01973530903058284.

Halim, A., Hasking, P., and Allen, F. (2012). The role of social drinking motives in the relationship between social norms and alcohol consumption. *Addictive Behaviors*, 37(12):1335–1341.

Hart, S. G. and Staveland, L. E. (1988). Development of NASA-TLX (Task Load Index): Results of Empirical and Theoretical Research. In Hancock, P. A. and Meshkati, N., editors, *Advances in Psychology*, volume 52 of *Human Mental Workload*, pages 139–183. North-Holland.

Head, J. and Helton, W. S. (2014). Sustained attention failures are primarily due to sustained cognitive load not task monotony. *Acta Psychologica*, 153:87–94.

Hines, D., Saris, R. N., and Throckmorton-Belzer, L. (2002). Pluralistic Ignorance and Health Risk Behaviors: Do College Students Misperceive Social Approval for Risky Behaviors on Campus and in Media? *Journal of Applied Social Psychology*, 32(12):2621–2640. _eprint: https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1559-1816.2002.tb02760.x.

Hofmann, W., Friese, M., and Strack, F. (2009). Impulse and Self-Control From a Dual-Systems Perspective. *Perspectives on Psychological Science*, 4(2):162–176.

Howland, M., Hunger, J. M., and Mann, T. (2012). Friends don't let friends eat cookies: Effects of restrictive eating norms on consumption among friends. *Appetite*, 59(2):505–509.

Joao, R. and Benno, T. (2012). Are Academics Messy? Testing the Broken Windows Theory with a Field Experiment in the Work Environment. *Review of Law & Economics*, 8(3):563–577. Publisher: De Gruyter.

Kahneman, D. (2011). *Thinking, fast and slow*. Thinking, fast and slow. Farrar, Straus and Giroux, New York, NY, US. Pages: 499.

Kimbrough, E. O. and Vostroknutov, A. (2018). A portable method of eliciting respect for social norms. *Economics Letters*, 168:147–150.

Krupka, E. L. and Weber, R. A. (2013). Identifying Social Norms Using Coordination Games: Why Does Dictator Game Sharing Vary? *Journal of the European Economic Association*, 11(3):495–524.

Krysowski, E. and Tremewan, J. (2020). Why Does Anonymity Make Us Misbehave: Different Norms or Less Compliance? *Economic Inquiry*, n/a(n/a).

Li, K. Z. (1999). Selection from Working Memory: On the Relationship between Processing and Storage Components. *Aging, Neuropsychology, and Cognition*, 6(2):99–116. Publisher: Routledge _eprint: https://doi.org/10.1076/anec.6.2.99.784.

Maehara, Y. and Saito, S. (2007). The relationship between processing and storage in working memory span: Not two sides of the same coin. *Journal of Memory and Language*, 56(2):212–228.

Mani, A., Mullainathan, S., Shafir, E., and Zhao, J. (2013). Poverty Impedes Cognitive Function. *Science*, 341(6149):976–980. Publisher: American Association for the Advancement of Science.

Miller, D. T. and McFarland, C. (1987). Pluralistic ignorance: When similarity is interpreted as dissimilarity.

Muraven, M. and Baumeister, R. F. (2000). Self-regulation and depletion of limited resources: Does self-control resemble a muscle? *Psychological Bulletin*, 126(2):247–259.

Paas, F. G. W. C. (1992). Training strategies for attaining transfer of problem-solving skill in statistics: A cognitive-load approach. *Journal of Educational Psychology*, 84(4):429–434.

Park, S.-Y., Yun, G. W., McSweeney, J. H., and Gunther, A. C. (2007). Do Third-Person Perceptions of Media Influence Contribute to Pluralistic Ignorance on the Norm of Ideal Female Thinness? *Sex Roles*, 57(7):569–578.

Peng, Z., Dai, C., Ba, Y., Zhang, L., Shao, Y., and Tian, J. (2020). Effect of Sleep Deprivation on the Working Memory-Related N2-P3 Components of the Event-Related Potential Waveform. *Frontiers in Neuroscience*, 14:469.

Schram, A., Zheng, J. D., and Zhuravleva, T. (2019). Contagious corruption: cross-country comparisons. Working Paper, European University Institute. Accepted: 2019-07-15T09:41:49Z ISSN: 1830-7728.

Schulz, J. F., Fischbacher, U., Thöni, C., and Utikal, V. (2014). Affect and fairness: Dictator games under cognitive load. *Journal of Economic Psychology*, 41:77–87.

Schwardmann, P. and van der Weele, J. (2019). Deception and self-deception. *Nature Human Behaviour*, 3(10):1055–1061. Number: 10 Publisher: Nature Publishing Group.

Shenhav, A., Musslick, S., Lieder, F., Kool, W., Griffiths, T. L., Cohen, J. D., and Botvinick, M. M. (2017). Toward a Rational and Mechanistic Account of Mental Effort. *Annual Review of Neuroscience*, 40(1):99–124.

Siegle, G. J., Ichikawa, N., and Steinhauer, S. (2008). Blink before and after you think: Blinks occur prior to and following cognitive load indexed by pupillary responses. *Psychophysiology*, 45(5):679–687. _eprint: https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1469-8986.2008.00681.x.

Ströfer, S., Ufkes, E. G., Noordzij, M. L., and Giebels, E. (2016). Catching a Deceiver in the Act: Processes Underlying Deception in an Interactive Interview Setting. *Applied Psychophysiology and Biofeedback*, 41(3):349–362.

Sweller, J. (1988). Cognitive Load During Problem Solving: Effects on Learning. *Cognitive Science*, 12(2):257–285. _eprint: https://onlinelibrary.wiley.com/doi/pdf/10.1207/s15516709cog1202_4.

Toplak, M. E., West, R. F., and Stanovich, K. E. (2011). The Cognitive Reflection Test as a predictor of performance on heuristics-and-biases tasks. *Memory & Cognition*, 39(7):1275–1289.

Van 't Veer, A., Stel, M., and van Beest, I. (2014). Limited Capacity to Lie: Cognitive Load Interferes with Being Dishonest. SSRN Scholarly Paper ID 2351377, Social Science Research Network, Rochester, NY.

Vrij, A., Mann, S. A., Fisher, R. P., Leal, S., Milne, R., and Bull, R. (2008). Increasing Cognitive Load to Facilitate Lie Detection: The Benefit of Recalling an Event in Reverse Order. *Law and Human Behavior*, 32(3):253–265.

Wechsler, H., Nelson, T. E., Lee, J. E., Seibring, M., Lewis, C., and Keeling, R. P. (2003). Perception and reality: a national evaluation of social norms marketing interventions to reduce college students' heavy alcohol use. *Journal of Studies on Alcohol*, 64(4):484–494.

Westbrook, A. and Braver, T. S. (2015). Cognitive effort: A neuroeconomic approach. *Cognitive, Affective, & Behavioral Neuroscience*, 15(2):395–415.

A Cognitive Load Task - *HCL* Instructions

In this task, you will be presented with a sequence of letters for 3 rounds plus 1 rehearsal round. Each letter will be presented for 2 seconds. In addition, in each round, you will have a starting amount of COP 35,000.

If the letter presented on the screen is the same letter you saw 3 rounds ago, you must press A, and if you see a different letter, you must press L. Each time you incorrectly press the letter A or the letter L, COP 1000 will be subtracted from your initial amount. At the end of the activity, one of the 3 rounds will be randomly chosen, and the amount you win in that round will be added to the final payout of the activity.

A mistake means pressing A or L incorrectly, but letting a letter go by and not pressing anything. Also, pressing other letters on the keyboard will be counted as incorrect answers. Therefore, you must pay as much attention as possible to the task.

For example, suppose the round selected for your payment is round 2, and in that round, you got it wrong 17 times. In this case, your payment for this part of the activity would be COP 18,000. On the other hand, suppose that in round 2 you got it wrong 5 times, in which case you would receive COP 30,000 .

B Cognitive Load Task - *LCL* Instructions

In this task, you will be presented with a sequence of letters for 3 rounds plus 1 rehearsal round. Each letter will be presented for 2 seconds. In addition, in each round, you will have a starting amount of COP 20,000.

A randomly selected fixed letter will appear in the center of the screen, and a sequence of random letters will appear 1 by 1 at the bottom of the screen. If you see a random letter at the bottom of the screen, you should press A; if you see a different letter, you should press L. For example, if the letter S was the random letter in the center of the screen, you should press A when the letter in the sequence matches the letter on the screen (S), and you should press L if it does NOT match the one currently presented on the screen (if it is not S).

For each time you incorrectly press the letter A or the letter L, COP 1000 will be subtracted from your initial amount. At the end of the activity, one of the 3 rounds will be randomly chosen, and the amount you have for that round will be added to the final payout of the activity.

A mistake means pressing A or L incorrectly, but letting a letter go by and not pressing anything. Also, pressing other letters on the keyboard will be counted as incorrect answers. Therefore, you must pay as much attention as possible to the task.

For example, suppose the round selected for your payoff is round 2 and in that round, you got it wrong 12 times. In that case, your payment for this part of the activity would be COP 8,000 . On the other hand, suppose that in round 2 you had 2 mistakes, in which case you would receive COP 18,000.

C Rule-Following Propensity Task Instructions

You will decide how to distribute 50 balls between two cubes.

Your task is to put each of the balls, one-by-one, into one of the two buckets: the blue bucket or the yellow bucket. The balls will appear in the center of your screen, and you can allocate each ball by clicking and dragging it to the bucket of your choice. For each ball you put in the blue bucket, you will receive 2.5 cents, and for each ball you put in the yellow bucket, you will receive 5 cents.

The rule is to put the balls in the blue bucket.

Once the experiment begins, you will have 10 minutes to put the balls into the buckets. When you are finished, please wait quietly until the end of the 10-minute period.

Your payment from this part will be based on your decisions: it is the sum of payments from the blue and yellow buckets.

If you have any questions, raise your hand and an assistant will write to you privately. Otherwise, you are ready to start.

Figure 8: Adapted from Kimbrough and Vostroknutov (2018)

D Personal Normative Beliefs Task Instructions

This part will describe a real situation in which a person, "Individual A," must make a choice.

For each of the possible choices that Individual A can make, you must evaluate whether that choice would be *"appropriate"* and *"consistent with moral or appropriate behavior"* or whether, on the contrary, it would be *"inappropriate"* and *"inconsistent with moral or appropriate behavior."* By appropriate, we mean behavior that is the *"right"* or *"ethical"* thing to do.

Your objective is to evaluate how appropriate or inappropriate Individual A's behavior is in the situation explained on the next page. ***When you are finished, you will receive a fixed payment of COP 5.000 for answering this part of the activity***.

E Normative Expectations Task Instructions

This part will describe a real situation in which a person, "Individual A," must make a choice.

For each of the possible choices that individual A can make, you must assess whether that choice would be *"socially acceptable"* and *"consistent with morally or socially acceptable behavior"*, or whether, on the contrary, it would be *"socially ucceptable"* and *"inconsistent with proper moral behavior"*. By socially acceptable, we mean behavior that most people agree is the *"right"* or *"ethical"* thing to do.

Your objective is your goal is to give the same answer as most of the people in today's session. ***When you are finished and if your answer is the same as the majority of the participants on this session you will receive a payment of COP 10.000 for answering this part of the activity***.

F Situation Example taken from Fischbacher and Föllmi-Heusi (2013)

The situation described below is real. This accurately describes a real task that an individual faced by participating face-to-face in a laboratory experiment some time ago.

Each participant received at their station a plastic cup containing a die and saw on their screen the following instructions:

For the following task, you will receive a reward and your payment for participating.

However, this reward is not the same for all participants. You determine your payout by rolling the dice in front of you twice once you are instructed to start.

Your first dice roll defines how much you receive. You can see the exact reward in the table below:

- Roll 1 - 0
- Roll 2 - COP 1,500
- Roll 3 - COP 3,000
- Roll 4 - COP 4,500
- Roll 5 - COP 6,000
- Roll 6 - COP 7.500

It will remain on the screen until you have entered your roll dice result.

The second roll is only to ensure that the die is working correctly.

You may, of course, roll the die more than twice—however, only the first roll dice counts. If you have any questions, raise your hand. If you are ready, press OK.

G Cognitive Reflection Test

1. A baseball bat and a ball cost COP 110,000 in total. The baseball bat costs COP 100,000 more than the ball. How much does the ball cost?

    - COP 10,000
    - COP 50,000
    - COP 5,000

2. In a lake there is an island. Every day this island doubles in size. If it takes 48 days for the island to cover the entire lake. How many days will it take for the island to cover half the lake?

    - 47 days
    - 10 days
    - 24 days

3. If it takes 5 machines 5 minutes to produce 5 cell phones. How long will it take 100 machines to produce 100 cell phones?

    - 10 minutes
    - 5 minutes
    - 100 minutes

H NASA TLX TASK

Please answer the following questions based on your experience during the memorization task; in this questionnaire, 0 means little and 20 means a lot.

- How much mental and perceptual activity was required (e.g., deciding, calculating, remembering, looking, searching, etc.)? Where 0 is very little mental activity and 20 is a lot of mental activity.
- How much physical activity was required (e.g., pushing, pulling, twisting, controlling, activating, etc.)? Where 0 is little physical activity was required, and 20 is a lot of physical activity was required.
- How much time pressure did you feel due to the pace at which the tasks or task elements occurred? Where 0 is little pressure and 20 is a lot of stress.
- How hard did you have to work to achieve your level of performance? Where 0 is you had to work a little, and 20 is you worked a lot.
- How well did you feel you performed to achieve the task objective? For example, where 0 is poor performance and 20 is good performance.
- How insecure did you feel during the task? Where 0 is very insecure, and 20 is very confident.

I Algorithm of Classification

To classify individuals based on their perceived injunctive norms into Deontists and Consequentialists, Aycinena et al. (2022) focus on the variation over the intensive margin. For each individual they elicited the social acceptability (SA) of 20 different possible reporting actions via the Krupka-Weber task.

They code each action as -1 (very socially inappropriate), -1/3 (somewhat socially inappropriate), + 1/3 (somewhat socially appropriate), and + 1 (very socially appropriate).

This allow them to estimate the following specification for each individual:

$$SA_{jis} = \alpha + \beta.Extent_j + \lambda.Situations_s + \delta.Truths_s + \varepsilon \tag{I.1}$$

where SA_{jis} denotes the social acceptability of situation s (there are 5 situations referring to each possible outcome of a non-payoff maximizing die roll) and j denotes the extent of a lie in reporting an outcome (i.e., whether a person advantageously over reports the die roll by one, two, etc...). In the regression, they also controlled when they elicited perceived norms regarding truth telling.

Specifically, each individual is classified into types according to the following criteria:

- Consequentialist type if $\beta < 0$ (significant at least at the 10% level), and the MSA of reporting a lie is lower than the MSA of reporting the truth while the mean social acceptability of reporting a lie is negative.
- Deontist type if $\beta = 0$ (or not significantly different from zero at the 10% level), the MSA of reporting the truth is greater zero, while the MSA of reporting a lie is negative.
- Normative Egoist type if $\beta > 0$ (significant at least at the 10% level) or $\beta = 0$ and the MSA of reporting a lie is greater than the MSA of reporting the truth.

Table 9: OLS on All Categories of Norm Perception Type (Normative Expectations)

	(1) Consequentialist	(2) Consequentialist	(3) Normative Egoist	(4) Normative Egoist	(5) Deontist	(6) Deontist	(7) Other	(8) Other
Treatment	0.0431	0.0513	-0.0164	-0.0230	-0.0574	-0.0353	0.0307	0.0101
	(0.0687)	(0.0683)	(0.0382)	(0.0292)	(0.0627)	(0.0623)	(0.0393)	(0.0377)
Is Female		0.0156		0.0335		0.0133		-0.0540
		(0.0723)		(0.0302)		(0.0655)		(0.0385)
Econ Related		-0.0899		0.0538*		0.156**		-0.100***
		(0.0718)		(0.0306)		(0.0660)		(0.0348)
CRT-Cognitive Score		0.151		-0.0912***		-0.00734		-0.0118
		(0.0963)		(0.0338)		(0.0862)		(0.0506)
Order Effect		0.0230		-0.0101		-0.107*		0.0696*
		(0.0685)		(0.0275)		(0.0625)		(0.0389)
Constant	0.509***	0.397***	0.0926***	0.256***	0.324***	0.296***	0.0741***	0.123***
	(0.0483)	(0.0754)	(0.0280)	(0.0452)	(0.0452)	(0.0698)	(0.0253)	(0.0399)
Observations	213	213	213	213	213	213	213	213
Sociodemographic Controls		X		X		X		X
	0.021	0.059	0.009	0.286	0.001	0.091	0.000	0.077

Notes This table shows results from OLS regressions on the. We consider a set of *Sociodemographic controls* includes age, gender, and a dummy variable that takes value 1 for those who study a career related to economics and the Cognitive Reflection Test Scores. Robust standard errors in parentheses *** p <0.01, ** p <0.05, * p <0.1

Table 10: OLS on All Categories of Norm Perception Type (Personal Normative Beliefs)

	(1) Consequentialist	(2) Consequentialist	(3) Normative Egoist	(4) Normative Egoist	(5) Deontist	(6) Deontist	(7) Other	(8) Other
Treatment	0.0680	0.0719	-0.0265	-0.0379	-0.128*	-0.117*	0.0868**	0.0832**
	(0.0677)	(0.0679)	(0.0328)	(0.0327)	(0.0678)	(0.0685)	(0.0371)	(0.0376)
Is Female		-0.0142		0.00215		0.0612		-0.0491
		(0.0712)		(0.0342)		(0.0724)		(0.0325)
Econ Related		0.120		-0.0541*		-0.0637		-0.00203
		(0.0733)		(0.0286)		(0.0721)		(0.0385)
CRT-Cognitive Score		0.0107		-0.0774**		0.0722		-0.00553
		(0.0927)		(0.0379)		(0.0947)		(0.0426)
Order Effect		0.148**		-0.00875		-0.0920		-0.0471
		(0.0672)		(0.0321)		(0.0682)		(0.0372)
Constant	0.380***	0.258***	0.0741***	0.135***	0.509***	0.519***	0.0370**	0.0885**
	(0.0469)	(0.0711)	(0.0253)	(0.0462)	(0.0483)	(0.0760)	(0.0183)	(0.0419)
Observations	213	213	213	213	213	213	213	213
Sociodemograpic Controls		X		X		X		X
R-squared	0.005	0.042	0.003	0.038	0.017	0.035	0.026	0.042

Notes This table shows results from OLS regressions on the. We consider a set of *Sociodemographic controls* includes age, gender, and a dummy variable that takes value 1 for those who study a career related to economics, the Cognitive Reflection Test Scores and, a dummy for the order of the normative belief tasks that took the value of 1 when the normative expectations task came first.. Robust standard errors in parentheses *** p <0.01, ** p <0.05, * p <0.1

Table 11: OLS on NASA Items

	(1) Overall Effort	(2) Mental Effort	(3) Performance	(4) Physical Effort	(5) Temporal Effort	(6) Frustation
Treatment	0.248***	0.230***	-0.351***	-0.0288	0.224***	-0.121***
	(0.0361)	(0.0328)	(0.0304)	(0.0327)	(0.0398)	(0.0433)
Constant	0.429***	0.582***	0.855***	0.191***	0.434***	0.598***
	(0.0257)	(0.0255)	(0.0174)	(0.0233)	(0.0278)	(0.0324)
Observations	213	213	213	213	213	213
R-squared	0.183	0.189	0.388	0.004	0.130	0.036

Notes This table shows results from a OLS on NASA-TLX questionnary. The dependent variable is the NASA TLX for Overall Effort, Mental Effort, ,Performance Physical,Effort ,Temporal Effort and, Frustation. Robust standard errors in parentheses *** p <0.01, ** p <0.05, * p <0.1

Table 12: OLS on Norm Perception Types (Normative Expectations)

	(1) Consecuensialist	(2) Consecuensialist	(3) Consecuensialist	(4) Deontist	(5) Deontist	(6) Deontist	(7) Other	(8) Other	(9) Other
Overall Effort	0.115	0.0932	0.128	-0.152	-0.213*	-0.235*	-0.0494	-0.0156	-0.0206
	(0.153)	(0.155)	(0.158)	(0.150)	(0.121)	(0.124)	(0.103)	(0.0863)	(0.0882)
General Effort	0.0153	0.0227	0.0194	0.0835	0.104	0.127	-0.0281	-0.0395	-0.0662
	(0.168)	(0.167)	(0.170)	(0.157)	(0.132)	(0.134)	(0.115)	(0.0969)	(0.100)
MSA		-0.152***	-0.140**		-0.425***	-0.420***		0.236***	0.218***
		(0.0553)	(0.0571)		(0.0424)	(0.0445)		(0.0515)	(0.0500)
Is Female			0.0154			-0.00755			-0.0462
			(0.0727)			(0.0577)			(0.0370)
Econ Related			-0.0872			0.117*			-0.0838**
			(0.0727)			(0.0602)			(0.0331)
CRT-Cognitive Score			0.167*			-0.112			0.0242
			(0.0979)			(0.0761)			(0.0504)
Order Effect			0.0252			-0.0551			0.0414
			(0.0685)			(0.0549)			(0.0350)
Constant	0.457***	0.391***	0.334***	0.321***	0.139*	0.161*	0.136**	0.237***	0.278***
	(0.0978)	(0.0976)	(0.121)	(0.0889)	(0.0765)	(0.0940)	(0.0541)	(0.0631)	(0.0786)
Observations	213	213	213	213	213	213	213	213	213
Sociodemograpic Controls			✓			✓			✓
R-squared	0.005	0.033	0.051	0.006	0.261	0.282	0.005	0.206	0.238

Notes This table shows results from OLS regressions to check robustness on the Personal Normative Beliefs results. We consider a set of *Sociodemographic controls* includes age, gender, and a dummy variable that takes value 1 for those who study a career related to economics and the Cognitive Reflection Test Scores. Robust standard errors in parentheses *** p <0.01, ** p <0.05, * p <0.1