Replication of Study 1 by Critcher et al.,
(2013, *Social Psychological and Personality Science*)

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Introduction

The speed at which someone makes a decision is often informative on how he or she arrived at that decision. As such, the decision time of others is a cue that observers might use when making social inferences. In two experiments, Critcher et al. (2013) tested the hypothesis that our judgments of morally relevant decisions are affected by how quickly the decision was made. Here, I replicate their findings from experiment 1. Participants read a vignette of two targets who chose to act either morally or immorally. One of the targets acted quickly, while the other acted slowly. Participants evaluated targets who made an immoral decision quickly more negatively than they did targets who made the same decision slowly. In contrast, they evaluated targets who made a moral decision quickly more positively than they did targets who made the same decision slowly. The decision x speed interaction on moral was mediated by perceived certainty of the targets decision.

Methods

Planned Sample

We plan to recruit 119 participants on Amazon Mechanical Turk. This is the same sample size as the original study.

Procedure and Materials

We followed the procedures as described in Critcher et al. (2013):

> Participants read about both Justin and Nate, two men who each independently came upon two separate cash-filled wallets in the parking lot of a local grocery store. Justin "was able to decide quickly" what to do. Nate "was only able to decide after long and careful deliberation." Participants assigned to the moral condition learned both men "did not steal the money but instead left the wallet with customer service." Those in the immoral condition learned instead that both men "pocketed the money and drove off."
>
> Immediately following the description of Justin and Nate's actions, we asked participants the following sets of items (all on 1–7 scales):
>
> ***Quickness***
> As a manipulation check, participants indicated how quickly (vs. slowly) the decision was made.
>
> ***Moral character evaluation***
> The three moral evaluation items had participants assess the agents' underlying moral principles and standards by asking whether the agent: "has entirely good (vs. entirely

bad) moral principles," "has good (vs. bad) moral standards," and "deep down has the moral principles and knowledge to do the right thing."

Certainty
We included 4 items to assess each actor's perceived decision certainty. Participants indicated "how conflicted [each] felt when making his decision" (reverse-scored), "how many reservations [each] had" (reverse-scored), whether the target "was quite certain in his decision" (vs. had considerable reservations), and "how far [each] was from choosing the alternate course of action."

Emotional impulsivity
In order to ensure that decision speed was not simply taken as a proxy for emotional impulsivity (a feature previously shown to affect moral judgments; Pizarro, Uhlmann, & Salovey, 2003), we assessed perceptions of the emotionally impulsive nature of the decision with 2 items. Participants indicated to what extent the person remained "calm and emotionally contained" (reverse-scored) and "became upset and acted without thinking."

Vignettes

Justin and Nate were walking to separate cars in the parking lot of Andronico's, a local grocery store, where they each spotted a different lost wallet next to the cars. Upon picking up the wallet and looking inside, each found several hundred dollars in cash. Each man considered whether he should return the wallet and money to the Customer Service desk at Andronico's, or pocket the money and drive away.

Moral Condition
Justin saw his decision as an easy one and was *able to decide quickly. He did not steal the money* and instead left the wallet with Customer Service

In contrast, Nate saw his decision as difficult and *was only able to decide after long and careful deliberation*. After several minutes of thinking in his car, *he too ecided not to steal the money* and instead left the wallet with customer service.

Immoral Condition
Justin saw his decision as an easy one and was *able to decide quickly. He pocketed the money and drove off.*

In contrast, Nate saw his decision as difficult and *was only able to decide after long and careful deliberation*. After several minutes of thinking in his car, *he too decided to pocket the money and drive off*

Access to Materials
Code for the experiment can be accessed at:
https://github.com/ycleong/PSYCH254/tree/master/task_jsPsych

The experiment is hosted at:
http://web.stanford.edu/~ycleong/PSYCH254/task_jsPsych/MCP.html

Analysis Plan

Manipulation check

We will first if we were successful at manipulating perceived decision speed. We asked participants to rate how quickly Justin and Nate made their decisions. This question was asked once after participants read the vignette, and once at the end of the experiment. We will consider the manipulation successful if quick Justin was rated as having made his decision more quickly than slow Nate. We will discard participants who failed either manipulation checks.

Main effect of decision on moral evaluation

Next, we will test to see if returning the wallet was an indicator of moral character by testing for the main effect of decision on moral evaluation in a repeated measures ANOVA with decision as a between-subjects factor.

Decision x Speed Interaction

In the same ANOVA, we will test for the interaction between decision and speed on moral evaluations. To further probe a significant interaction, we will examine the simple effects of speed on moral evaluations separately for participants in the moral condition and participants in the immoral condition.

Mediation Effects

Using a series of simple slope analyses, we will test our prediction that the decision x speed interaction was mediated by participants' perception of Justin and Nate's decision certainty. First, we established the relationship between decision speed and perceived certainty. Following which, we tested for the relationship between decision speed and moral evaluation, while accounting for perceived certainty. If perceived certainty significantly reduces the effect of decision speed on moral evaluation in both the moral and immoral conditions, we can conclude that perceived certainty mediated the decision x speed interaction on moral evaluation.

Differences from Original Study

In this replication, I recruited participants from Amazon Mechanical Turk whereas in the original study, participants were students at the University of California, Berkeley or members of the surrounding community. There is no reason to suspect that participants on Mechanical Turk would differ significantly from in-lab participants in the inferences that they draw from other people's decision time, so I do not expect the difference in sample to lead to drastically different results.

The original study did not discard participants. In our study, we will discard participants who failed either of our manipulation checks. This is to ensure that we will only be considering participants who read and understood the vignettes presented to them

(Post Data Collection) Methods Addendum

Actual Sample

We collected 119 participants from Amazon Mechanical Turk. 4 subjects were excluded for failing either manipulation checks. The final sample included 53 participants assigned to the moral condition and 62 participants assigned to the immoral condition.

Differences from pre-data collection methods plan

Due to the randomization procedure, our replication had an unbalanced design (53 participants in moral condition, and 62 participants in the immoral condition), which is problematic for the mixed ANOVA procedure used in the original study. Instead, we modeled our data using a linear mixed effects model. Decision and Speed were both coded using effect coding to allow us to easily examine main effects.

Results

Data preparation

Data from the replication and accompanying analysis code can be found at:

Manipulation Check

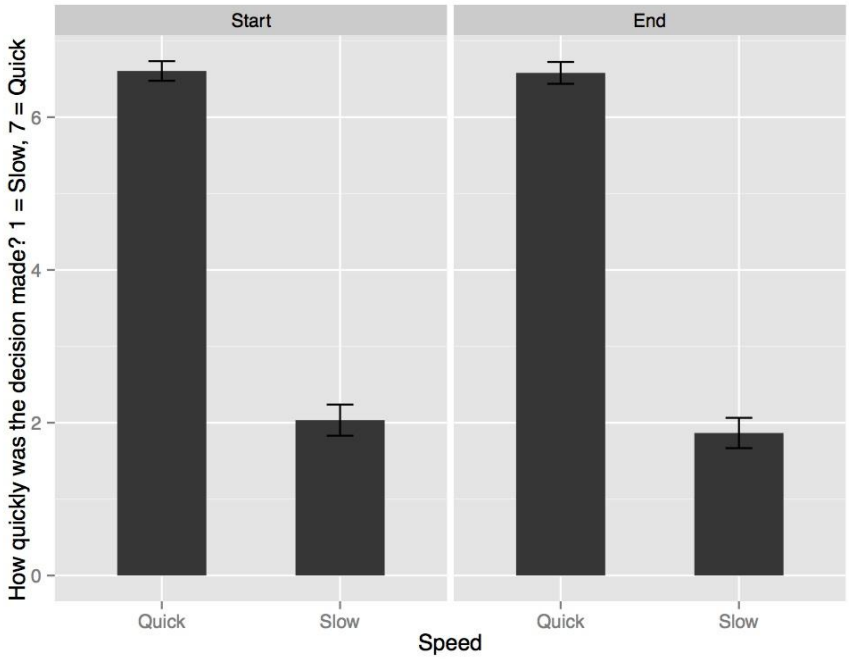

Figure 1. Speed ratings of Justin (Quick) and Nate (Slow). Left panel. Ratings at the start of the experiment. **Right panel.** Ratings at the end of the experiment. In both cases, quick Justin was rated as having made his decision more quickly than slow Nate. Error bars denote 95% confidence intervals computed using a bootstrapping procedure with 10000 iterations.

Participants rated how quickly each target made his decision immediately after they read the vignette and at the end of the experiment. In both cases, quick Justin was rated as having made his decision more quickly than slow Nate (Fig. 1, at the start of the experiment: $t(119) = 31.32$, $p < 0.001$, at the end of the experiment $t(119) = 30.93$, $p < 0.001$), confirming the success of our manipulation. To ensure that we only considered participants who read and understood the vignettes presented to them, subjects who failed either manipulation checks were excluded from the later analyses. 4 subjects were excluded to yield a final sample of 53 participants assigned in the moral condition and 62 participants in the immoral condition.

Confirmatory analysis

We used a linear mixed effects model to examine the effect of decision and decision speed on moral evaluation. Unsurprisingly, there was a main effect of decision – targets were rated as more moral if they chose to return the wallet than if they chose to keep the wallet ($b = 1.18$, $t(113) = 16.8$, $p < 0.001$). There was no main effect of speed on moral evaluation ($b = -0.07$, $t(113) = -1.23$, $p = 0.22$). Crucially, there was decision x speed interaction on moral evaluation ($b = 0.64$, $t(113) = 12.1$, $p < 0.001$). When targets chose to return the wallet, speed had a positive effect on moral evaluation. In contrast, when targets chose to keep the wallet, speed had a negative effect on moral evaluation (Fig. 2).

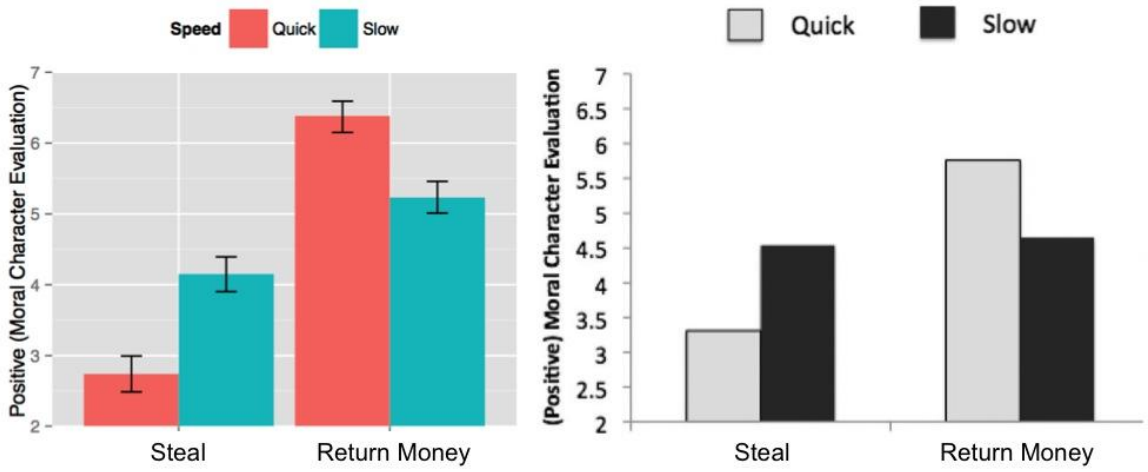

Figure 2. Moral character evaluation by decision and speed. Left panel. Data from current replication. Error bars denote 95% confidence intervals. **Right panel**. Data from Experiment 1 of Critcher et al., 2013 for comparison.

Next, we tested if the decision x speed interaction on moral evaluation is mediated by perceived certainty. Consistent with the mediation account, Quick Justin was rated as more certain than slow Nate ($b = 3.9$, $t(228) = 34.12$, $p < 0.001$), suggesting that participants took decision speed to be a signal of decision certainty. We also found a significant interaction between decision and perceived certainty on moral evaluation ($b = 0.31$, $t(120) = 13$, $p < 0.001$). To formally test if perceived certainty mediated the interaction between decision and speed on moral evaluation, we ran several simple slope analyses and examined the relationship between speed, certainty and moral evaluation separately for participants in the two conditions (moral vs. immoral).

When targets returned the wallet (moral condition), Quick Justin was rated as more certain than Slow Nate (b = 3.67, t(104) = 19.91, p < 0.001). Quick Justin was also rated as more moral than Slow Nate (b = 1.15, t(52) = 8.892, p < 0.001), but the effect of speed on moral evaluation was reduced and became only marginally significant when accounting for the effect of perceived certainty (b = 0.50, t(643) = 1.69, p = 0.10). A Sobel test indicated that the reduction was significant, supporting out account that the effect of speed on moral evaluation was mediated by perceived certainty (z = 2.5, p = 0.013).

When targets stole the money (immoral condition), Quick Justin was also rated as more certain than Slow Nate (b = 4.12, t(122) = 29.16, p < 0.001). However, Quick Justin was rated as less moral than Slow Nate (b = -1.41, t(61) = -8.74, p < 0.001). A Sobel test indicated that the effect of speed on moral evaluation was significantly reduced when perceived certainty was taken into account (z = -3.16, p = 0.002). In fact, the effect of speed on moral evaluation was no longer significant when controlled for the effect of perceived certainty (b = 0.01, t(96) = 0.025, p = 0.99), suggesting that when targets acted immorally, perceived decision certainty fully mediated the effect of speed on moral evaluation.

Given that perceived certainty mediated the effect of decision speed on moral evaluation both when targets chose to act morally and when targets chose to act immorally, we can conclude that perceived certainty mediated the interaction between decision and decision speed on moral evaluation (Fig. 3).

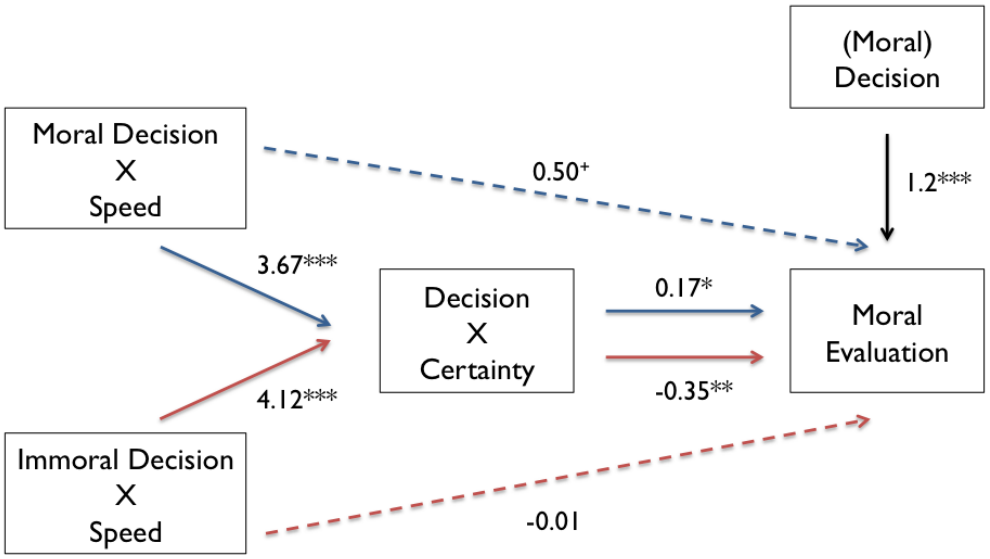

Figure 3. Path model summarizing proposed relationship between decision, decision speed, perceived certainty and moral evaluation. Targets' decision had a direct main effect on moral evaluation. The decision x speed interaction on moral evaluation was fully mediated by perceived certainty. Numbers denote unstandardized regression coefficients. Blue path indicates simple effects when targets acted morally while red path indicates simple effects when targets acted immorally. $^{+}$ p < 0.1, * p < 0.05, ** p < 0.01,*** p < 0.001.

Discussion

Summary of Replication Attempt

We successfully replicated Critcher et al.'s (2013) original finding that decision speed polarized moral evaluations. Consistent with the original paper, we found that participants rated a target as more moral when he chose to act morally quickly than when he chose to act morally slowly. In contrast, participants rated a target as less moral when he chose to act immorally quickly than when he chose to act immorally slowly.

We also replicated the finding that the interaction between decision and speed on moral evaluation is mediated by participants' estimate of the target's certainty in his decision. Faster decisions signal greater decision certainty, suggesting that the decision was an easy one and one that was consistent with the actor's moral dispositions. In contrast, slow decisions signal greater decision conflict, suggesting that the decision was difficult and the actor likely considered other alternatives before acting. As such, making a decision quickly elicited stronger moral evaluations of the actor while making a decision slowly tempered moral evaluations.

Our successful replication of Critcher et al. (2013) supports the broader claim that our evaluation of morally relevant decisions depends not only what decision was made, but also how the decision was made.

Commentary

While we successfully replicated the sign of the effect described in Critcher et al. (2013), we were not able to test if our results also replicated the size of the effect. The data reported in the original paper were insufficient to compute an effect size for the purpose of comparison. Moreover, we modeled our data using a linear mixed effects model while the original study used a mixed ANOVA, so the effect sizes would not have been directly comparable.

We note that the current paradigm suffers from two potential confounds. First, participants were told in the vignette that the quick decision was "easy", and the slow decision was "difficult" and required "long and careful deliberation". Participants could have been influenced by the descriptors accompanying the different conditions rather than the manipulation of decision speed. Second, the paradigm suffers from the issue of stimulus selectivity (Wells & Windschitl, 1999). Since only one scenario was presented, it would be premature to generalize current findings to moral evaluation broadly.

While these issues were identified during the planning of this replication, we decided against modifying the paradigm because we wanted to conduct a direct replication. To the credit of the original authors, they conducted a second experiment with a different scenario where participants were only provided with the speed of the decision, and were not explicitly told that one decision was easy while the other was difficult (see Experiment 2, Critcher et al., 2013). The authors successfully replicated the results from Experiment 1. We considered replicating Experiment 2 instead of Experiment 1, but did not have the resources to reproduce the original sample size of the entirely between-subjects design (N = 533).

References

Critcher, C. R., Inbar, Y., & Pizarro, D. A. (2013). How quick decisions illuminate moral character. *Social Psychological and Personality Science*, *4*(3), 308-315.

Wells, G. L., & Windschitl, P. D. (1999). Stimulus sampling and social psychological experimentation. *Personality and Social Psychology Bulletin*,*25*(9), 1115-1125.