

Compliance Externalities: Field Evidence of Morally Tutelary Influence?[☆]

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Abstract

In a natural setting, we collect data on bikers' decision to run a red traffic light under different circumstances. In all situations, deterrence incentives from legal sanctions remain constant. In each case, the situation mainly differs by who is present at the pedestrian traffic light that aligns with the bikers' traffic light. Opportunities for bikers to run the red light therefore differ by who may be observing them. We find that the average biker is about 60% likely to violate the red traffic light. Interestingly, this probability drops to about 10% when children are present at the pedestrian traffic light. This observation ties in with different streams in the literature about deterrence and rule compliance. In a vignette study, we aim to disentangle the different motives. [Note: This manuscript is current work in progress. We are setting up the vignette study right now and hope to present also these results at the European SELS conference in Amsterdam.]

Keywords: [...], [...], [...], [...], [...]

1. Introduction

Why people comply with the law is a complex and likewise fascinating question. A person may just respond to deterrence incentives directly. However, from others' compliance decisions a person may also draw inferences about the probability and severity of legal sanction, about social sanctions, or even about the social desirability of complying with the law. Moreover, people may take on the role of norm entrepreneurs.

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We report new evidence on compliance decisions from a natural setting. We collected data on how often bikers run the red traffic light and simultaneously collect data of the decision environment. We find that, in general, the likelihood of the average biker to run the red light is about 60%. Interestingly, as soon as a child is simultaneously present at the pedestrian traffic light the likelihood of the biker violating the traffic rule drops sharply to about 10%. We aim to disentangle the motives for this effect in a subsequent vignette study. As our observations from the natural environment were collected in Hamburg, we invite students from Hamburg to participate in the vignette study. In the vignette study, we additionally control for other factors such as personality traits. [to be added: main findings from the vignette study.] The vignette study will be conducted at the end of March 2016, so this paper is real work in progress.

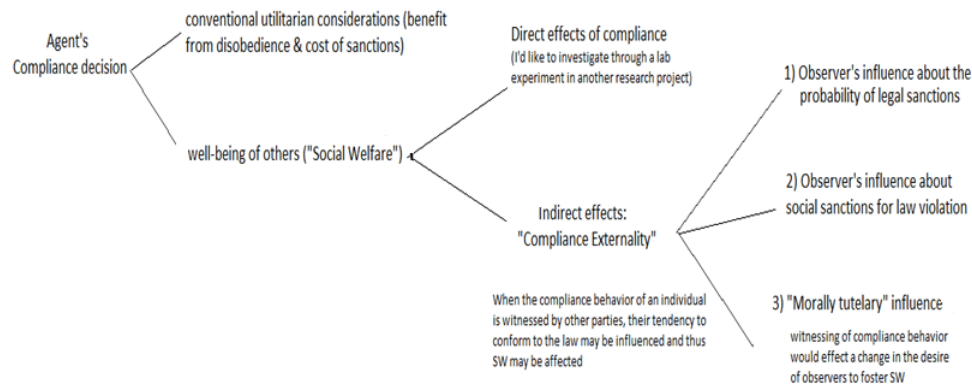
This working paper proceeds as follows. Section 2 provides background about what may affect the compliance decision. Section 3 reports on the data collection in the field and our main finding and the tentative vignette study. Section 4 provides an analysis of the field data and reports main results. Data from the vignette study still have to be collected and analyzed. Therefore, we refrain from precipitant conclusions as of to date.

2. Literature Review

This paper relates to several important streams in contemporary research. First, our results speak to the deterrence literature. Since the seminal contribution by Becker [3], the deterrence hypothesis holds that rule violations decrease in the certainty and severity of punishment. Since then, researchers study how deterrence incentives interact with other aspects of compliance behavior, e.g. cultural norms [7], crowding-out of deterrence incentives,[cf.: 8], self-serving and impulsivity tendencies [cf.: 13], or emotions [cf.: 10]. Specifically, Shavell [16] elaborated on the idea of compliance externalities that indirectly affect an agent’s compliance decision. The witnessing of compliance behavior facilitates inferences about possible legal consequences and possible social sanctions. Witnessing of compliance behavior would also allow to update inferences about the social desirability of rule compliance. In this regard, Shavell [16] speaks about “moral tutelage”. Our data speak to the idea of compliance externalities in the form of moral tutelage. In the natural setting, we observe a drastic drop in the probability that bikers run a red light when children are present. In line with the idea of moral tutelage, social desirability of rule compliance may be especially salient in the presence of children. The findings of our subsequent vignette study reveal that ... [to be added].

Moreover, our paper is related to the norm compliance research which can bring together the deterrence and social norms literature. Previous research holds that prosocial motives affects individual decision making [e.g.: 2, 7] and thus can contribute to compliance decisions. Evidence suggests, however, that seemingly innocuous changes in the decision context can drastically alter the extent to which individuals exhibit prosocial behavior [e.g.: 9, 6, 12]. Therefore,

Figure 1: Taxonomy of Individual Compliance Decision

Shavell, *When is compliance with the law socially desirable?*, JLS 2012

it has recently been argued that observed prosocial behavior is driven by a desire to adhere to social norms.¹ The core idea is this: prosocial behavior is not so much driven by some stable preferences over payoff distributions, but rather by preferences for following known social rules. These social rules specify the most socially appropriate action for a decision maker given a set of circumstances. When a decision maker evaluates a possible action, she compares it to an external, socially defined normative standard, and – when internalized – judges her own behavior according to its conformity to the norm.² To the extent that the norm is prosocial, a person who suffers more from violating norms will behave more prosocially. In this sense, “norms make preferences social” [11, p. 3]. Our paper contributes to this line of research by providing novel evidence from the field. In light of the norm compliance literature, our observations can be interpreted such that the presence of one child at the pedestrian traffic light alters bikers’ decision context. As bikers’ evaluation of the action to run the traffic light changes relative to the new most socially appropriate action, we observe a much higher likelihood of compliance. Our vignette study supporting the field data reveals that ... [to be added].

¹Another explanation holds that prosocial decisions result from self- and other-signaling. See e.g. Benabou and Tirole [4], Andreoni and Bernheim [1]

²This can be modeled with a simple utility function in which deviations from norms generate a utility cost.

3. Data

3.1. Field data

The data collection took place in two locations³ in Hamburg, Germany, between May and June 2015. In each of these two locations, a bike path is crossing perpendicularly a public road.⁴ The locations are in a densely populated area close to the city center and the two bike paths are used daily by thousands of bikers. Data were collected manually by one of the author and a research assistant (“the data collectors” from now on) in the two locations during multiple workdays and at different hours of the day between 7.00 and 20.00.⁵

The data collector were sitting on the bench of a bus stop (location 1) or on a bench in the courtyard of a school (location 2) with a book open in front of them and the spreadsheet to record observations inside the book. The data collectors recorded the binary decisions made by bikers to comply with the traffic regulation in a situation where a) the bikers are traveling on the bike path b) they face a red traffic light for the bikes, while the traffic lights is green for car drivers and c) they have to cross the road. In a situation like this, bikers can either comply with the traffic regulation and stop at the red traffic light, waiting then some seconds\minutes for the green light, or decide to break the law and cross the road despite the red signal (assuming no car is approaching).

The procedure followed to code an observation as “compliant” requires the that the four following conditions realize at the same time. First, a biker arrives at the crossroad coming from the bike path and stops. If the biker is not on the bike path, that did not count as an observation. Second, the bike traffic light is red while the traffic light regulating the traffic for the cars running on the perpendicular road is green.⁶

³Location 1 is in Friedrichstrasse and location 2 in Fruchttallee. Appendix A includes a map with the exact coordinates.

⁴Friedrichstrasse is a two-way street while the branch of Fruchttalle where the observations were collected is a one-way street.

⁵The dataset includes observations collected: a) by the author working independently b) by the research assistant working independently and c) by the author and the research assistant working contemporaneously in the same location but independently. The procedure for observations collected in c) works as follows. First, both the research assistant and the author collect observations in the same location albeit working independently. Second, at some regular time intervals the observations collected by each of them are compared (notice that each observation is precisely identified by the exact time it was collected). Third, only observations that match in the two dataset are kept. We did not identify any systematic difference between data collected with procedure a), b) or c).

⁶Notice that the bike traffic light and the car traffic lights could be in five possible combinations: a) cars green - bikes red; b) cars red - bikes green; c) cars yellow+green- bikes red d) cars red - bikes yellow+green e) red-red. The yellow light that makes possible combinations c) and d) appears and remains displayed together with the green light few seconds before the traffic light turns from green to red. Combination e) is possible because the switch from red to green of one of the two traffic lights happens with some seconds of delay compared to the switch from yellow+green to red. We did not collect observations involving compliance decisions when the traffic lights are in combination b), c), d) or e).

Third, while the traffic lights remain green for car and red for bikes, the crossroad is clear from cars, buses, motorbikes or any other vehicle for more than seven seconds. If first and second points are realized but the third point is not (for example because after less than seven seconds a vehicle is passing through the crossroad; or because the yellow light in the car traffic light turns on before the seventh second), that situation does not constitute an observation. Fourth, the biker does not cross the road until the bike traffic light becomes green.

The procedure followed to code an observation as “not compliant” requires that the following conditions realize. First, the bike traffic light is red while the car traffic light is green since at least 3 seconds.⁷

Second, the biker crosses the road while the bike traffic light is still red *and* the car traffic light is still green.

For each situation when the bike traffic light becomes red and the car traffic light green, we recorded at maximum one observation. Therefore, if during the time span of a traffic light bike-red & car-green more bikers where (not) compliant, only one observation - the first that realizes itself - was recorded. Moreover, if a compliant and non-compliant situation happened contemporaneously, we dropped the observation. We also suspended the data collection in the following situations, where we thought there was the risk that confounding factors could be at work: a) the biker is driving while talking at a mobile phone b) police\firefighters sirens are audible c) in location 1, a bus stops to load passengers at the bus-stop located in the proximity of the crossroad.

For each observation, we recorded the following additional information: location; day and time; gender of the bikers; if the data collectors thought the biker is “young” (below 50yo) or “old” (above 50yo); if the bikers was white Caucasian or from a different ethnicity. Furthermore, we coded as 0 or 1 information regarding the presence of bystanders observing the biker’s compliance decision. Finally, we recorded if there were children observing the compliance decision of the biker. We define “children” individuals with a body height less than 120cm. In order to facilitate the task of the data collector in classifying as “children” or bystanders those individuals close to the threshold height, we attached a red poster advertising a concert to the traffic light, making sure that the poster lower edge lies exactly at 120cm. For the children variable, we additionally recorded if, respect to the biker, the child was at the same street side or on the opposite one, if he\she was alone or with an adult. In the latter case, we distinguished the cases where the child was able to walk independently from the situation where he was carried on a stroller, a bike child seat or he was holding the adult’s hand.

We gather a total of 445 observations, 79 of whom are compliance decisions

⁷We are interested in comparing compliance and non-compliance decisions taken by bikers that face the situation “car traffic light green & bike traffic light red”. In order to make sure that bikers are aware they are not in situation e) (both traffic lights red), we excluded observations involving compliance decisions taken in the three seconds after the passage from “red-red” to the situation of interest happened.

of bikers taken when a children was observing.

3.2. Survey Data

We build a survey to gather information regarding the motivations behind compliance with bike traffic regulation, risk attitudes, trust, personality traits and socio-demographic characteristics. In the key part of our survey, we describe a situation similar to the one we analyzed in the field data gathering of section 3.1. Each participant is asked to imagine being a biker on a bike path that has to cross a road. The crossroad is regulated by a traffic light that is red for the traffic coming from the bike-path and green for road traffic. No vehicles are on the road and no policemen is around. The biker has to decide whether to cross the road immediately or to wait for the traffic light becoming green.

Up to this point, the situation described is identical for all the participants. We add to the description four possible features that creates four different scenarios. The four situations are the following:⁸ a) *Isolation*: no one else is around; b) *Bystander & No Child*: a person is standing on the opposite side of the road, watching in your direction; c) *Bystander & Child*: a person and a child of five or six years old are standing on the other side of the road, watching on your direction; d) *Child Alone*: a child of five or six years old is standing on the other side of the road, watching on your direction. To clarify the situation described in the text, each of the four scenarios is combined with a vignette that make visually salient the correspondent situation.⁹ Each respondent faces only one of the four situations and she is not aware that other respondents possibly received different descriptions. The specific situation that a participant faces is chosen randomly. After the respondent stated the intention whether to cross the red traffic light or wait, we also ask to briefly summarize the reasons behind her decision.

The other parts of the survey were identical for all the respondents.¹⁰ To measure risk attitudes and trust, we used the same question employed by the German socio-demographic panel survey.¹¹ The personality traits reports a measure of the “Big 5” as in Rammstedt and John [15]. We additionally implement the cognitive reflection test as developed by Primi et al. [14]. A section concerning basic socio-demographic characteristics was completing the survey.

The survey was programmed using the software Otree Chen et al. [5] and it was administered online using the platform SurveyMonkey® to a sample of German respondents during the month of March 2016. We collected survey responses from a total of N respondents.

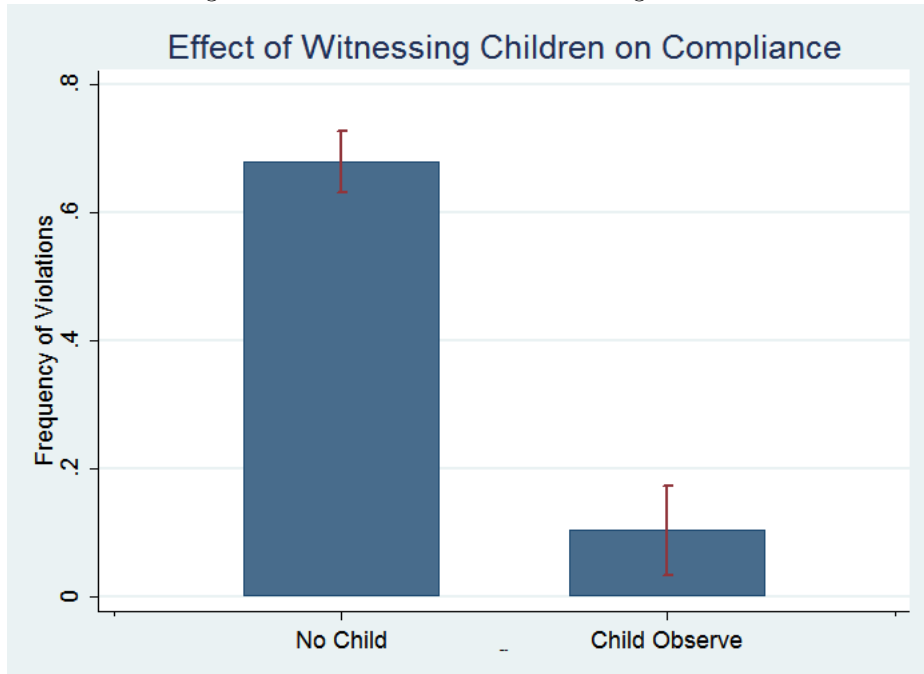
⁸In the survey description, the situations were of course not labeled.

⁹The original survey is in German and it is available upon request. We add a English translation of the description of the four scenarios and the correspondent vignettes in appendix B.

¹⁰To avoid order effects, we randomized the order in which questions were asked.

¹¹“Please choose a number between 0 and 7, where 0 stands for ‘absolutely no’ and 7 for ‘absolutely yes’: In general, do you consider yourself a person that takes risks? In general, do you think you can trust people?”

Figure 2: Violations in Presence of Witnessing Children



4. Results

4.1. Field Data Analysis

We begin the analysis by comparing the frequency with whom bikers violate the traffic rules by crossing when the traffic light is still red for them in situations with or without children observing. Figure 2 compares plots these frequencies and relative standard errors. While 68% of bikers do violate the traffic law and cross the road when children are not present, this percentage reduces to 10% when children are present. A two-side t-test for equality of means reject the null hypothesis at the 1% level.

We estimate the likelihood that the effect of violations is the same when bystanding children are present or not. Table 1 reports the results of a Linear Probability Model (models 1 and 2) and of a logistic regression (models 3-5). The dummy “children” takes value 1 when a children is observing the biker’s compliance decision. The variable “front” controls for the fact that children are on the same side of the road or on the opposite side compared to the biker. We include as a control the dummy variable “otherbystanders” that takes value 1 when there is at least one non-children person observing the biker. The variables “old”, “female” and “race” refer to observables characteristics of the bikers, as defined in section 3.1 above. The variable morning indicates that the observation was collected in the morning before 12.00 pm while “peaks” indicates that the

observation was collected during peak hours (e.g. 7.30 am - 9 am or 5.30 pm - 7pm). Finally, the dummy “Friedrich” takes value 1 if the observation was collected in the location Friedrichstrasse. We estimated robust standard errors.

Results confirm that the presence of observing children has a strong (p-value<.01) and negative impact on bikers’ likelihood to violate the traffic regulation. The result is valid for any model specification, whether we include or not the controls specified above.¹²

Table 1: Probability of Traffic Rule Violation

	(1)	(2)	(3)	(4)	(5)
	LPM	LPM	Logit	Logit	Logit
children	-0.522*** (0.05)	-0.510*** (0.10)	-0.536*** (0.06)	-0.504*** (0.06)	-0.452*** (0.12)
otherbystanders	-0.077* (0.04)	-0.086* (0.05)	-0.077* (0.04)	-0.067* (0.04)	-0.074 (0.05)
old	-0.245*** (0.04)	-0.258*** (0.05)		-0.223*** (0.04)	-0.229*** (0.04)
morning	0.066 (0.04)	0.093* (0.05)		0.065* (0.04)	0.091* (0.05)
peak	-0.012 (0.05)	-0.033 (0.06)		-0.018 (0.05)	-0.033 (0.06)
Friedrich	-0.074 (0.05)	-0.136** (0.06)		-0.078* (0.04)	-0.128** (0.06)
female		-0.116** (0.05)			-0.110** (0.05)
race		-0.025 (0.09)			-0.042 (0.09)
front		0.013 (0.12)			-0.068 (0.23)
<i>N</i>	445	335	445	445	335
<i>R</i> ²	0.273	0.269			
pseudo <i>R</i> ²			0.216	0.228	0.226

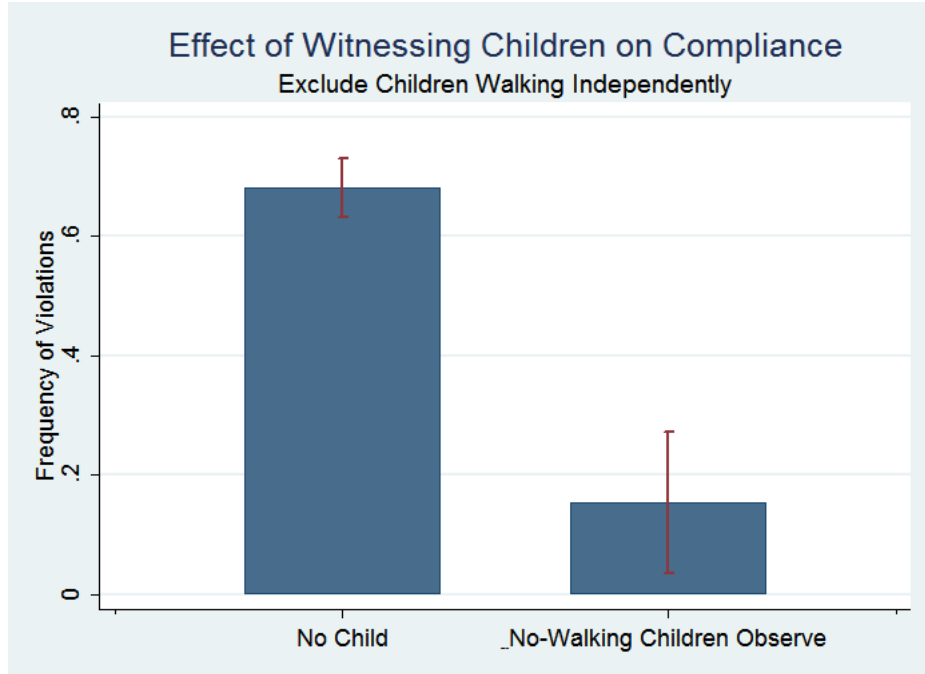
* p<0.10, ** p<0.05, *** p<0.01; Robust SE

A possible confounding factor for the identification of morally tutelary influence effects is that bikers can become more careful when a child is around because they fear an unexpected incautious child’s movements.¹³ Should this

¹²As Table 1 shows, once we insert all the controls we lose 100 observations. The reasons for that exclusion is most often that the data collector was not able to record an observable characteristic (e.g. it might be difficult to assess the race of a biker that flashes through the crossroad). In few cases, when two data collectors were working contemporaneously in the same location, it happened that the control variable was not codified in the same way by both of them. (e.g. one data collector considered the biker “old” while the other “young”). In these cases, we coded the control characteristic as a missing value.

¹³We are grateful to Marco Casari for suggesting this point.

Figure 3: Violations in Presence of Witnessing Children Not Walking Independently



concern be relevant for the bikers' behavior, the decision to comply with the traffic regulation would be affected by the children's presence for reasons other than morally tutelary influence. Controlling for the fact that the child is physically kept under surveillance by an adult and therefore incapacitated to engage in unexpected dangerous actions for the bikers clears up this concern. Figure 3 plots frequencies of rule violations excluding those observations where children were walking independently. A t-test for the difference of the means rejects the equivalence null hypothesis at the 1% level.

Table 2 reports a Linear Probability Model (models 1 and 2) and a logistic regression (models 3-5) identical to the the ones described above but for the exclusion of observations involving children walking independently. Results confirms that, for any model specification, the presence of bystanding children implies a strong and significant (at the 1% level) reduction of the likelihood that bikers violate the traffic law.

4.2. Survey Data Analysis

Data from the survey will be available by the end of March 2016.

5. Conclusion

To be added.

Table 2: Probability Traffic Violation - Exclude Children Walking Independently

	(1)	(2)	(3)	(4)	(5)
children	-0.497*** (0.07)	-0.547*** (0.11)	-0.483*** (0.08)	-0.459*** (0.08)	-0.507*** (0.15)
otherbystanders	-0.092* (0.05)	-0.073 (0.05)	-0.089* (0.05)	-0.064 (0.05)	-0.071 (0.05)
old		-0.262*** (0.05)		-0.234*** (0.04)	-0.235*** (0.04)
morning		0.097* (0.05)		0.059 (0.04)	0.095* (0.05)
peak		-0.030 (0.06)		0.001 (0.06)	-0.025 (0.06)
Friedrich		-0.136** (0.07)		-0.081* (0.05)	-0.127** (0.06)
female		-0.117** (0.05)			-0.113** (0.05)
race		0.014 (0.10)			0.002 (0.09)
front		0.068 (0.16)			0.009 (0.26)
<i>N</i>	378	315	378	378	315
<i>R</i> ²	0.118	0.207			
pseudo <i>R</i> ²			0.090	0.158	0.168

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$; Robust SE

Appendix A

Coordinates of Data Gathering Locations



Appendix B

DESCRIPTION OF SITUATION FOR QUESTIONNAIRE

You are biking on a bike-path while you approach a crossroad regulated by a traffic light. You have to cross the perpendicular road and to continue on the bike path. The traffic light for bikes is red, signaling that bikers are supposed to stop. The traffic light for car is green. The road is clear from cars and any other vehicles. You can perfectly see the road on both sides for hundreds of meters and you are sure that no cars or any other vehicles is approaching the crossroad. The landscape around you is a park completely flat with no buildings; hence, it is impossible that a hidden police officer is observing the scene.

- Situation a, *Isolation*: Furthermore, you are perfectly sure that no other people are around and so no one is watching you.
- Situation b, *Bystander & No Child*: Standing on the sidewalk on the other side of the road, a pedestrian is watching in your direction. Except for the pedestrian, you are perfectly sure that no other people are around and so no one is watching you.
- Situation c, *Bystander & Child*: Standing on the sidewalk on the other side of the road, a pedestrian with a child are watching in your direction. The child could be five or six years old. Except for the pedestrian and the child, you are perfectly sure that no other people are around and so no one is watching you.
- Situation d, *Child Alone*: Standing on the sidewalk on the other side of the road, a child is watching in your direction. The child could be five or

six years old. Except for the child, you are perfectly sure that no other people are around and so no one is watching you.

Do you cross the road while the traffic light for bikers is red or do you stop at the crossroad and wait until it becomes green?

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