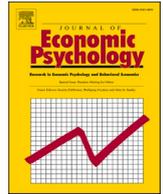




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## Tra i Leoni: Revealing the preferences behind a superstition<sup>☆</sup>

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### ABSTRACT

We examine a superstition for which adherence is nearly universal among its target population. Using a combination of field interventions that involve unsuspecting participants and a lab-style value elicitation, we investigate the nature and strength of peoples' underlying preferences. While a substantial minority of people are willing to incur a relatively high individual cost in order to adhere to the superstition, for many, adherence is contingent on the behavior of others. Our findings are consistent with the idea that it is the conforming nature of the majority that sustains the false beliefs of the minority.

“Chi passa tra i Leoni, non si laurea in Bocconi.”

## 1. Introduction

Superstitions can influence behavior and economic outcomes in striking ways. Fear of the number 13 (“triskaidekaphobia”) causes hotel guests to avoid the 13th Floor, and many US buildings over twelve floors to have the 13th floor numbered 14. This can impede the

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response of emergency personnel, and some municipalities have banned the practice.<sup>1</sup> Lucky and unlucky numbers influence the market price of real estate, equities, and other goods.<sup>2</sup> Belief in the Chinese Zodiac influences the timing of births in many Asian families, and appears to influence parental investment as well. The disproportionate number of births in dragon years causes demand spikes for limited public services and may impact the labor market outcomes of the birth cohort.<sup>3</sup>

Many common superstitions involve behavior related to the control of good or bad luck.<sup>4</sup> Various psychological accounts for why individuals engage in superstitious behavior have been investigated (see Vyse, 2013). Formal analyses of why superstitions persist have focused on aspects that influence the value of “experimentation” with new behaviors (Fudenberg & Levine, 2006, 2009).<sup>5</sup> Another highlighted aspect concerns a superstition’s potential selective value as a group-level trait in the evolution of culture (Boyd & Richerson, 2002; Henrich, 2004; Nunn & Sanchez de la Sierra, 2017). However, prior studies have typically not measured the strength of people’s preferences, or investigated alternative explanations for superstitious behavior, such as the role of social preferences.<sup>6</sup> Importantly, the strength of people’s underlying preferences has generally not been measured.<sup>7</sup>

The goal of the present study is to investigate a superstition that is a widely-adhered to among its target population. We measure the strength of the adherents’ underlying preferences. Further, we explore the extent to which a preference to conform to the existing social norm may lead people to act as if they believe in the superstition, and, in turn, validate the beliefs of those who do.<sup>8</sup>

We examine a striking pattern of superstitious behavior that is widespread among students at Bocconi University in Milan, Italy.<sup>9</sup> Using a combination of field interventions involving unsuspecting participants and a lab-style value elicitation, we reveal the preferences behind their superstition.<sup>10</sup> While the object of study is idiosyncratic to Bocconi University, the hypotheses we test are of general interest and our results provide insight by analogy for completely different settings.

We next describe, in turn, the superstition, the psychological aspects of interest, and our research methods.

**The Superstition:** “Via Sarfatti 25” is the oldest building of classrooms at Bocconi University, and most lectures are held there. The entrance is broad, with three adjacent passageways. The middle passageway is separated from the adjacent lateral ones by two columns, each of which is fronted by a statue of a lion (see Fig. 1). A widely known refrain, after which the campus newspaper “Tra i Leoni” is named, has it that “One who passes between the lions, will not graduate at Bocconi,” which is a translation from the Italian original seen above. Accordingly, students almost universally shun the middle passageway, opting instead for one of the two lateral passageways. The impact on the flow of students in and out is stark. Fewer than 1 in 20 people entering or exiting the building pass between the lions, and the ones who do are almost invariably faculty or foreign exchange students.

**The Preference:** *Why* do students appear to have an aversion to walking between the lions? We consider two explanations:

1. The students prefer to adhere to the superstitious rule per se. For example, they may believe that they will not graduate if they violate it, or at least that the probability of such a bad outcome increases non-negligibly.<sup>11</sup>
2. The students prefer to conform to behavior of their peers. For example, because (virtually) all of the other students take a lateral passageway, they follow suit in order to avoid behaving differently.<sup>12</sup>

Our goal is to shed light on the empirical relevance of these two explanations among the student population, and to measure the strength with which the aversion is held.

**The Methods:** To evaluate the empirical relevance of explanations 1 and 2, while at the same time measuring the strength of students’ aversion to walking between the lions, we conducted three independent but complementary experiments:

<sup>1</sup> See Carroll (2007), Perkins (2002), Scalza (2015).

<sup>2</sup> See Ng, Chong, and Du (2010), Shum, Sun, and Ye (2014), Fortin, Hill, and Huang (2014), He, Liu, Sing, Song, and Wong (2019), Hirshleifer, Jian, and Zhang (2016), Agarwal, Choi, He, and Sing (2016).

<sup>3</sup> See Wong and Yung (2005), Agarwal, Qian, Sing, and Tan (2018), Yip, Lee, and Cheung (2002), Goodkind (1991), Johnson and Nye (2011).

<sup>4</sup> See for instance Kramer and Block (2008). The term “superstition” does not appear to have a commonly agreed upon definition; see Vyse (2013), Risen (2016) and Lindeman and Svedholm (2012) for different accounts and relevant discussions.

<sup>5</sup> In our case (described below) experimentation seems to have little value because there isn’t much opportunity to get feedback, given the nature of the superstition.

<sup>6</sup> An exception is Hajikhameneh and Iannaccone (2017), who provide evidence for how social preferences relate to false beliefs about agency.

<sup>7</sup> In contemporaneous work, Bayer, Ruffle, Shtudiner, and Zultan (2018) find that Israeli women in the second half of pregnancy are more willing to incur a cost to avoid challenging their superstition not to decorate a room before the baby is born.

<sup>8</sup> The topic of social norms is broad (see, e.g. Bicchieri, 2016), with conformity, in particular, being an active topic of interest among psychologists and economists (see Bernheim (1994), Bernheim & Exley (2015), Michaeli & Spiro (2017), Pryor, Perfors, & Howe (2018) for relevant work).

<sup>9</sup> At the time when the study was conducted, all authors were affiliated with Bocconi University, either as faculty, or students.

<sup>10</sup> We are only aware of two other studies of superstition involving unsuspecting participants: Boshier (1973) and Pole, Berenson, Sass, Young, and Blass (1974). None of these studies measure the strength of superstitious beliefs. We are grateful to Stuart Vyse for bringing these studies to our attention.

<sup>11</sup> We infer student beliefs from their avoidance behavior rather than eliciting their beliefs directly.

<sup>12</sup> The motivation to conform is complex and does not necessarily rule out belief-based explanations. Besides the motive to affiliate or have positive self-regard, students may conform to the behavior of others in order to have accurate beliefs, or behave as if they do (Cialdini & Goldstein, 2004). While we cannot rule out this possibility, we believe it is unlikely that students update their beliefs after watching others walk between the lions, first because there is no feedback due to the delayed consequences, and second because the behavior of others could be driven by differences in preferences, rather than differences in beliefs. We thank an anonymous referee for pointing out these alternative mechanisms.



Fig. 1. The Lions.

*Study 1* involves a field intervention in which we (partially) block off one of the two lateral passageways, thereby increasing the cost of indulging the superstition. Our main goal is to rule out a potential confound to explanation 1 and 2. It is conceivable that students who walk through the lateral passageways, rather than the middle, do so merely because this offers the shortest path to any other location on campus. If so, however, students who deviate away from the blocked-off lateral passageway should now walk through the middle passageway, as it offers a shorter path to their destination.

*Study 2* involves another field intervention, conducted during an evacuation drill. The evacuation drill offered an alternative approach to ruling out the shortest-path confound as the drill imposed considerable waiting cost on those exiting through the lateral passageways. Further, we sent groups of student confederates, with whom we had contracted, to walk through the middle passageway. The purpose was to reduce the cost of walking through the middle passageway for any student affected by explanation 2. We measure the degree to which our intervention caused more students to walk through the middle. *Study 2* has similarities with [Pole et al. \(1974\)](#), who study whether observing a confederate walk under a ladder increases the likelihood that the observer will do so.

*Study 3*, which combines lab and field features, quantifies the strength of students' aversion to walking between the lions, and uses different treatments to further evaluate relevance of explanations 1 and 2. Using a version of the Becker-DeGroot-Marschak method ([Becker, Degroot, & Marschak, 1964](#)), we elicit the students willingness-to-accept money in exchange for agreeing to walk between the lions.<sup>13</sup> Depending on treatment, they were informed either that they would walk "alone" or "together with the others that accept".

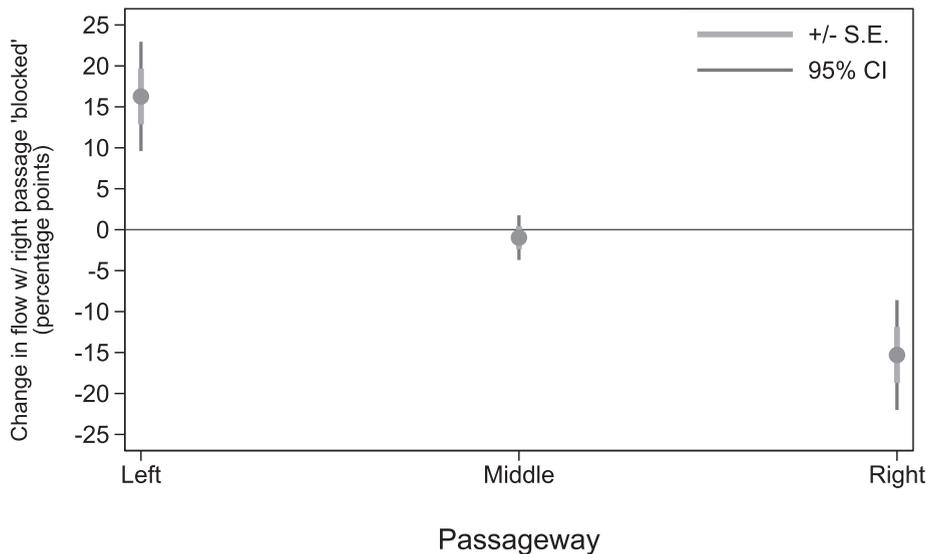
The remainder of the paper is organized as follows. The three studies, as well as the results we obtained, are described in depth across Sections 2–4. Section 5 summarizes and concludes.

## 2. Blocked passageway – Study 1

The fact that students are all familiar with the superstition against taking the middle passageway and behave in accordance with it, does not guarantee that their behavior reflects an underlying aversion to the middle passageway. For example, any student who wishes to minimize the distance of the route between his or her classroom and another destination on campus should not take the middle passageway, as it is visibly obvious that taking the middle passageway will (slightly) increase the distance traveled.<sup>14</sup> In addition, given that students do not use the middle passageway, any student without a clear preference among passageways may find following other students (herding), or repeating his or her previous decision (habit), to be less costly than deciding which passageway to take each time, anew.

<sup>13</sup> The entire experimental procedure is described in the Appendix.

<sup>14</sup> The reason for this is because doors in front of each passage face the street, and the sidewalk is bordered by a hedge. For any student entering the building, the nearest door will not be the middle one. For any student exiting the building, he or she will have to make an immediate left or right turn. The Google streetview image of the building entrance (Via Sarfatti 25) can be found here: <https://goo.gl/maps/xpcAPew6ry12>.



**Fig. 2.** The marginal effect of partially blocking the right door on the percentage of students passing through each passageway (multinomial logit model). The standard errors are approximated using the Delta-method.

Study 1 was designed to test whether the non-use of the middle passageway is driven by an underlying preference to avoid it. To this end, we design a simple field experiment in which one of the lateral passageways near the building entrance was blocked off for a period of time, and student responses were observed.

**Design:** A 15 min intermission period between classes was chosen to observe students entering and exiting the building. A total of 850 people were observed, and video-recorded, choosing whether to take the left, middle or right passageway as they entered (or exited) the main lecture building at Bocconi University.

The treatment intervention followed a between-subjects reversal-like (ABA) experimental design, in which the people entering and exiting the building were “assigned” to the first control group in the first 5 min of the observation period, the treatment group in the second 5 min of the observation period, and the second control group in the final 5 min of the observation period.<sup>15</sup>

The treatment involved blocking the right passageway (as seen from the inside of the building). The obstructions used to block the passageway were not perfect and could be navigated by a determined student willing to incur some cost of delay, and effort.<sup>16</sup>

This design allows us to determine if students harbor an underlying aversion to taking the middle passageway: after abandoning the obstructed right passageway, will students reveal their aversion by choosing the further left passageway over the more convenient middle one?

**Results:** In the time periods not including the intervention, 58.5 percent of students chose the right passageway, 36.7 percent of students chose the left passageway, and 4.7 percent of students chose the middle passageway. When the right passageway was (partially) blocked students’ choice of passageway revealed strong evidence of an aversion to taking the middle passageway. The students who are diverted away from the right passageway invariably choose the further left passageway over the closer middle one. Fig. 2 plots for each door the percentage point change in the number of students choosing each passageway when the right passageway is blocked. As can be seen, there is no increase in the number of students passing through the middle passageway.

**Discussion:** The patterns uncovered by Study 1 cannot be explained by students minimizing the distance traveled, or reducing the cost of choosing between subjectively equivalent passageways via herding or habit. Instead, when faced with an additional cost to behaving in accordance with the superstition, students choose to incur the cost and avoid walking between the lions.

### 3. Evacuation drill – Study 2

While Study 1 establishes that some concern for superstition affects most students, the reason why students behave as they do is less clear. As mentioned in the introduction, one potential explanation is that students are directly influenced by superstitious beliefs, i.e.

<sup>15</sup> The period of observation (15 min) was chosen to coincide with the time between the ending and starting points of the classes in order to maximize the potential number of students observed.

<sup>16</sup> The passageway was partially blocked with a large tripod and camera, as well as experimenters interacting with the tripod, camera, and each other. Experimenters had large press badges hanging from their necks to induce to be discourage interference.



Fig. 3. Students exiting the building during the fire drill.

they wish to avoid the potential material or emotional consequences associated with violating the rule.<sup>17</sup> Another explanation is that students prefer to conform to existing social norms.

Study 2 is designed to test (i) whether the aversion to walking between the lions can be attributed, at least in part, to an aversion towards standing out, and (ii) whether students are willing to incur a qualitatively different, and arguably higher, cost to avoid walking between the lions.

**Design:** An evacuation drill previously scheduled by the university was chosen to serve as a natural experiment in which the cost of avoiding walking between the lions was expected to increase substantially. During the drill, which was not announced to students in advance, all persons inside the building are instructed to walk immediately towards the only non-emergency exit to the building. With people avoiding walking between the lions while exiting, the increased flow created a bottle-neck at the lateral passageways, and lead to delays (about 60 s) in exiting the building for those who avoided walking between the lions, as can be seen in the photo presented in Fig. 3. While the delay did not place the students under any physical danger, the cost of adhering to the superstition was arguably stronger than in Study 1.<sup>18</sup>

Study 2 involved an intervention intended to test whether a preference to conform plays a role in students' decision to avoid the middle passageway. To this end, we recruited 16 student confederates to walk between the lions with the goal of making it salient to students waiting that they would not stand out by walking between the lions, thereby reducing the cost of violating the taboo for someone with conformity motives. Moreover, if sufficiently many students followed, there was a potential for a herd effect that could be self-sustaining. The confederates divided into four groups of four students each, and the groups exited the building by walking between the lines in a staggered manner so as to appear natural, with all confederates exiting within a thirty second period.<sup>19</sup>

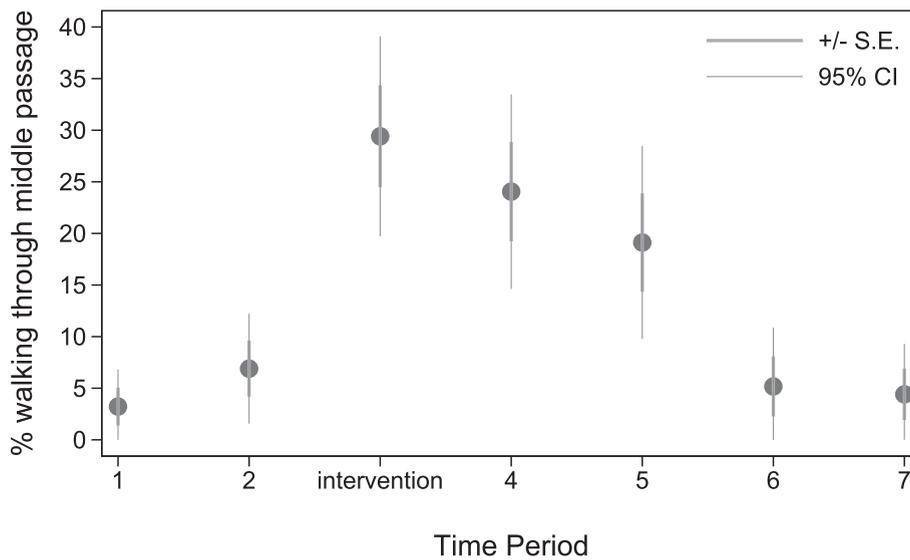
**Results:** We divide the recording period into seven equally spaced time windows, each one lasting 30 s. The intervention occurred during the third time window. In Fig. 4 we present the percentage of students walking between the lions in each time window. During the first and second time window students are already experiencing significant delays, yet, the percentage of people exiting the building (faculty and students) that walk between the lions does not increase markedly above the baseline in the first two time windows. As can be seen in Fig. 4, the intervention during the third time window has a notable effect that cascades into following periods, before eventually receding.

**Discussion:** The results of Study 2 demonstrate that *some* students who behave in accordance with the superstitious rule will

<sup>17</sup> Material and emotional consequences are not necessarily separable. While some students may explicitly consider the possibility that they will not graduate, others may merely anticipate "bad luck," in which case the emotional consequences (e.g. anxiety) occur immediately, whether or not the material consequences ever occur. We observe anecdotal evidence for both.

<sup>18</sup> For the students needing to re-enter the building after the evacuation the cost of waiting may be lower than others. On the other hand, waiting outside on a sunny day is arguably more pleasant than standing inside in a crowded line with the alarm ringing.

<sup>19</sup> Video available upon request.



**Fig. 4.** The percentage of students passing between the lions in each time interval. The standard errors are binomial with confidence intervals given by the normal approximation.

violate it if they observe other students near them doing so. This indicates that for these students, their aversion to walking between the lions is weak. Moreover, the fact that these students behaved in accordance with the rule before the intervention despite the salient cost of waiting suggests that some form of conformity, rather than herding, explains their initial choice of the lateral passageway during the evacuation drill.<sup>20</sup> On the other hand, the precise nature of the conformity revealed by their change in behavior is less clear. In particular, observing other students walk between the lions may lead to a decreased cost of standing out, or the fact that many are violating the superstition may lead observers to update their beliefs regarding the probability that they will not graduate if they also pass between the lions. In Study 3, we partially address this by manipulating the cost of standing out an alternative manner.

Importantly, because the majority of students continue to incur the non-negligible cost of waiting despite the intervention, this leaves open the possibility that many students avoid walking between the lions because of a superstitious belief. Therefore there may exist a strongly held superstition among a non-negligible subset of the student population.

#### 4. Walk-for-pay – Study 3

While the waiting cost in Study 2 is arguably higher than the detour cost in Study 1, the strength of the students' preference to adhere to their superstition is not clear. Our third study is designed to address this and investigate the prevalence of the aversion to walking between the lions in the student population, and to measure its strength in economic terms using a willingness-to-accept elicitation. Importantly, we conduct the study as a between-subjects treatment design by manipulating the scope for conformity motives. We introduced this feature of the design because while the confederate intervention in Study 2 demonstrates that a substantial fraction of students are willing to walk between the lions with the minimal cue of other students doing so, it is less clear whether this cue signals (i) that they can avoid standing out, (ii) that there is a faster way to exit the building, or (iii) that the consequences of the superstition are slight.

**Design:** We measured the strength of students' aversion to walking between the lions by eliciting their minimum willingness-to-accept in order to do so. We experimentally manipulated the degree to which subjects would “stand-out” if they were to walk between the lions.

With the cooperation of a course instructor, the study was administered with anonymous student responses in the minutes just after students completed their final exam so that: (1) students would be more attentive and cooperative, (2) students would be seated to maximize privacy, (3) attendance would be maximized, (4) students would not be in a rush to attend another class,<sup>21</sup> and (5) the superstition would potentially be more salient. The study was conducted in classrooms in the same building as the two lion statues in order to assure that there would be no fixed cost in walking from where their preferences were elicited to the building exit. We selected courses which included only students enrolled in their final semester at the university, so that their exposure to the superstition would be the greatest. A total of 183 students participated, with 93 students from the economics discipline, and 90 students from the law discipline. Because the educational and demographic background of law students places less emphasis on math and science than that of

<sup>20</sup> Andreoni, Nikiforakis, and Siegenthaler (2020) show that a similar mechanism arises in a controlled laboratory setting where subjects are prompted to deviate from a social norm.

<sup>21</sup> It is unlikely for a student to have commitments immediately after the exam as the exact ending time is typically not predictable.

the economics students, we had reason to expect their willingness-to-accept to differ as well.<sup>22,23</sup>

Each participant received: (1) a sealed envelope with a random monetary offer, and (2) an attached sheet with a single-question eliciting their willingness-to-accept.<sup>24</sup> There were two experimental treatments that manipulated the scope for conformity motives: (1) the “Alone” treatment, in which it was emphasized that students who accepted the offer would walk between the lions alone, and (2) the “Group” treatment, in which it was emphasized that students who accepted the offer would walk between the lions with the other students who accepted. The treatments were administered between-subjects with block randomization at the session level. The translation of the question is presented below, where the text in bold corresponds to what varied between each treatment.

*Please choose \*one\* of the following three options by circling your chosen option. If you choose option B, please fill in the blank.*

- A. I will accept the payment written in my envelope, regardless of the amount, and walk, [**“alone”**/ **“together with the others that accept”**], between the two lion statues as I exit the building.
- B. I will accept the payment written in my envelope and walk, [**“alone”**/ **“together with the others that accept”**], between the two lion statues as I exit the building, but I will do this only if the payment in my envelope is greater than or equal to \_\_\_\_\_ Euros (and I will not accept if the payment is below this amount).
- C. I will not accept the payment written in my envelope, regardless of the amount.

The experimenter emphasized that the study was not a simulation, and that there were real monetary consequences to their decisions. In particular, the students were informed that (1) the offers involved a real strictly positive payment in Euros, (2) their acceptance of an offer was binding, and (3) the only way they could avoid the possibility of accepting was to circle item C, or to decline to participate by leaving the question blank. In order to increase the credibility and salience of the potentially large payments, the experimenter held up, for the students to see, the 3000 Euros in cash that was available, and then informed them that, while all envelopes contained a monetary offer, some contained offers in the hundreds of Euros.<sup>25</sup> The students were informed that some of them would be paid for real by randomly drawing their response sheets after collecting them.<sup>26</sup> Because we did not tell subjects the precise range of possible payments, we interpret “A” responses as a willingness to walk between the lions for any positive amount of money. More details on the procedure followed are presented in the appendix.

**Results:** In Fig. 5 we plot the percentage of students who choose to accept any offer (A) and the percentage of students who choose to reject any offer (C), by treatment (Alone vs. Group) and field of study (Law vs. Economics). As can be seen, nearly half of students will accept any offer in the alone treatment, whereas a minority 11 percent of students will reject any offer. The increase in the percentage of students accepting any offer in the group treatment is 14.7 percentage points ( $p = .047, SE = 7.3pp$ ).<sup>27</sup> The treatment does not appear to affect the students who reject any offer, with group treatment having just a marginally higher rate of rejections of 2.5pp ( $p = .58, SE = 4.6pp$ ). Economics students on average accept any offer more often than Law students do (12.5pp), but the difference is not statistically significant ( $p = .091, SE = 7.3pp$ ). The law students appear to be more inclined to reject any offer with a 11.2pp higher rate of rejecting any offer ( $p = .014, SE = 11.2pp$ ). This pattern of findings shows that conformity to the behavior of other students influences a significant fraction of students, and that the fraction of students for which the superstition is strong enough to reject any offer is small.<sup>28</sup>

Next we include the students reporting a non-zero minimum willingness-to-accept (WTA)—i.e. choosing B—where we code WTAs that are greater than 1000 euros as 1000 euros because the instructions stated that the highest offer was in the hundreds. We also code the choice of C as 1000 euros, while the choice of A is coded as 0 euros. We find that the median WTA in the alone treatment is 10 euros, while the median in the group treatment is 0 euros, which is a significant difference ( $p = .019$ , permutation test). The largest difference of WTAs appears at the 75th percentile where the group treatment has a WTA of 100 euros whereas the alone treatment has a WTA of

<sup>22</sup> In our subject pool, 33 percent of law students studied in a “Liceo Scientifico” (science-oriented high school) versus 58 percent of the economics students. In addition, economics students performed better in the mathematical section of the admission test with a 13.06/30 average score vs. 8.98/30 for the law students.

<sup>23</sup> For the economics students, their prior exposure to math and science may diminish the prevalence of superstitious belief, while their economics courses may lead to an increased tendency to choose more “rational” responses. For students choosing to study law, they may have a greater tendency to conform.

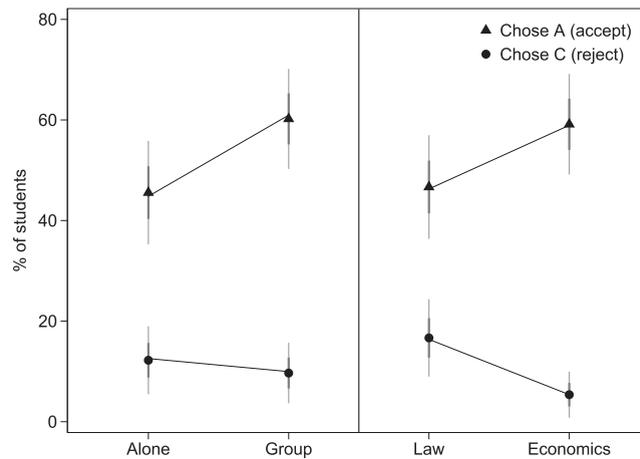
<sup>24</sup> The response sheets were matched to the envelopes using a unique two-letter alphabetic code written on each. The subset of students who were paid completed a receipt form, but their name was not recorded with the data.

<sup>25</sup> The amount in the envelope varied between 5 Euros and 150 Euros. We attempted to improve the credibility of the payment and the study in two ways: (i) we prominently displayed euro bills in the thousands that could be gained, (ii) we emphasized the seriousness of the study and the fact that student responses were to be taken as commitments.

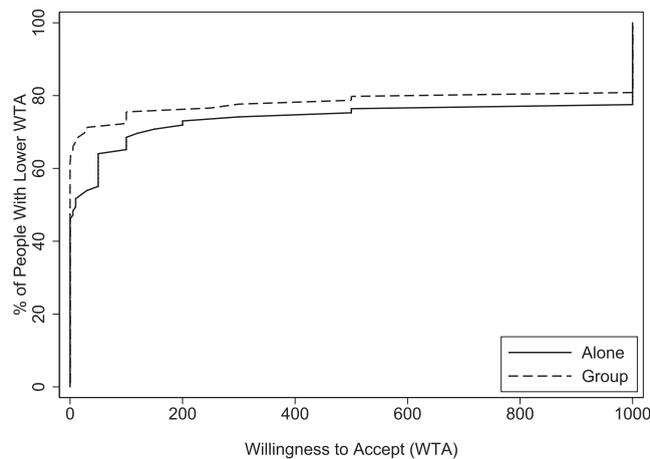
<sup>26</sup> A total of ten students were selected to be paid in both the economics and law classes.

<sup>27</sup> P-value and standard error (in percentage points) are reported in parenthesis.

<sup>28</sup> An anonymous reviewer suggested that students may have inferred that more people would accept the offer in the group condition than the alone condition because of the wording in the group condition (“together with the others that accept”). Thus, although we discuss the results as people being more willing to abandon the superstition in the group condition because they would walk with others and be less worried about sticking out, it may also be because they believe more people will accept the offer to abandon the superstition in the group condition. Further, we acknowledge that people may be more willing to abandon the superstition in the group condition because they believe the superstition less when reminded that there are other students who don’t believe.



**Fig. 5.** The percentage of students choosing (A), to accept any offer, or (C), to reject any offer, by treatment and classroom type. The standard errors are binomial with confidence intervals given by the normal approximation.



**Fig. 6.** The cumulative distribution function of the willingness-to-accept (WTA) by treatment.

500 euros, this difference however is not significant. The cumulative distribution function of the WTA for each treatment is reported in Fig. 6. As can be seen, the alone treatment first-order stochastically dominates the group treatment. The percentile WTA differences remain significant at the .05 level up to the 65th percentile.

In Fig. 7 we report the CDF of the WTAs by treatment, for each field of study. As can be seen, the CDF of the WTA accumulates mass at a faster rate among the economics students than among law students, regardless of treatment. Combined with the higher rate of choosing A, this fact leads to the law students' WTA to first-order stochastically dominate that of economics students, regardless of the treatment. Further, the CDF indicates that group treatment has a stronger impact on the economics students' tendency to report a low WTA, although economics students tendency to report a low WTA regardless of treatment means that this early stochastic dominance by the alone treatment's CDF does not persist. For the law students on the other hand, because their CDF accumulates mass at a slower rate regardless of treatment, the stochastic dominance of the alone treatment persists throughout its support.

## 5. Discussion

The stark pattern of near-universal adherence to a superstitious rule appears to be far less dramatic under closer examination. While we find what appears to be a dramatic exhibit of students avoiding walking between the lions when blocking of a lateral passageway (Study 1), and during an evacuation drill (Study 2), these patterns are weakened with a modest intervention. During the evacuation drill students are willing to walk between the lions after seeing just a few members of their cohort walk between the lions. In the same way, when offered a payment to walking between the lions, nearly half of students revealed a willingness to accept any offer. While it is true that the 75th percentile WTA is 250 euros, this amount is small relative to the potential negative consequences from violating the superstition (failing to graduate), indicating a vanishingly small probabilistic belief for a student who explicitly entertains one.

On the other hand, a substantial minority of students are powerfully affected by the superstition in a way that does not appear to be

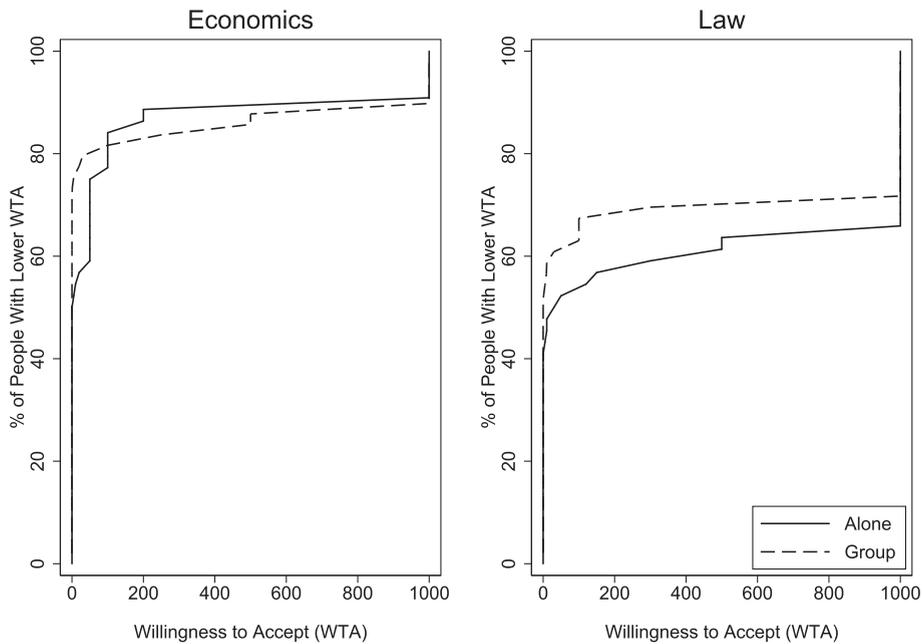


Fig. 7. The cumulative distribution function of the willingness-to-accept (WTA) by treatment for each discipline of study.

explainable by conformity motives. Twenty percent of students require more than 1000 euros to pass between the lions (or will reject any offer), regardless of treatment. This rate is consistent with estimates of superstitious beliefs among students found in prior surveys (Albas & Albas, 1989).<sup>29</sup> Further, given that students are likely responding to their implicit beliefs—e.g. anticipated negative feelings or discomfort towards tempting fate—rather than their explicit beliefs—e.g. the probability of not graduating after walking between the lions—the fact that 35 percent of all subjects demand at least 50 euros indicates that this discomfort is widespread and non-negligible.

While the individual and social costs typically incurred from this behavior appear to be low, we have found that a substantial minority of students are willing to incur a relatively high individual cost.<sup>30</sup> The existence of such a strong preference to avoid such an apparent triviality suggests that we should not underestimate the importance of superstition and other forms of magical thinking among a substantial segment of the population. More generally, policies that target false beliefs with the intention to change individual and group behavior may face substantial headwinds so long as those false beliefs are validated by the conforming behavior of the majority.

### Appendix A. Study 3 procedure

The experiment was run over two days in three different classrooms. On the first day, two separate classrooms participated in the experiment, each containing approximately 50 test-taking students. These students, though, were of the same bachelor degree and the exam was the same in the two classrooms: the division was due to a space constraint only. On the second day, only one classroom participated in the experiment, but it had nearly 100 test-takers. The exam being taken in the first day was mathematics and in the second day, law. These exams fall under different departments and fields of studies within the university and therefore, it can be assumed there were no repeated students on the second day of experimentation.

The presiding exam proctors and responsible professors were approached no more than a few days prior to the exam as to minimize potential communication with the students. This also served to ensure that the experiment would not interfere with students' focus prior or during the exams.

Once the test-time was over and exams were collected, the responsible professor/proctor called for the attention of all students, and for them to remain in their spaced exam seating arrangement. The professor/proctor then read the following short paragraph given to

<sup>29</sup> Albas and Albas (1989) find that 20–33 percent of students engage in superstitious exam related behavior, albeit mostly in the form of bringing on good luck.

<sup>30</sup> Three anecdotes suggest that the actual WTAs may in some cases be higher than reported: (i) a student who reported a WTA of 120 euros expressed second thoughts when it came time to open the envelope, and then relief when it was revealed that the offer was only 65 euros, (ii) a student who reported a WTA of 1000 Euros was reminded that the offer was in the hundreds, the student affirmed that the reported amount was the minimum and did not request to modify the WTA, (iii) the students who accepted the offer expressed hesitation when it came to walk between the lions, even in the group treatment.

them by the experimenters:

Can I have everyone's attention, you now have the opportunity to be paid for answering a single question, this will only take 5 min to hand out and collect your responses and you may make a considerable amount of money. If you need to leave, please leave quickly and quietly.

After reading the short paragraph and allowing students to leave the professor/proctor introduced one of the experimenters who announced:

We believe this is a great opportunity, that only requires five minutes of your time. Nevertheless, we understand that some of you might be in a rush. If this is the case, please raise your hand and leave the room in silence. Before we hand out the question, we want to remind you that exam rules still apply for this survey. Please do not talk to your neighbors or look at your neighbors sheets, and please don't let others look at your sheets. What we are handing out is real, it is a single question that involves real money and there is a considerable amount of money in some of these envelopes here so it is in your interest to respond to these questions carefully. We will hand you two things (1) an envelope and (2) a sheet of paper. You will hold on to the envelope until you leave, but you won't open it. You will quietly read the sheet, fill it out, fold it in half to keep it private, and return it to us. We will put your sheets of paper in this box, mix them up, and select 5(10) of them randomly, and if you are selected, you will be paid based on your decisions and the amount in your envelope.

After confirming that each student had a pen, they were reminded again of exam rules while the experimenters handed each of them one envelope with the hidden offer and one sheet of paper with instructions on one side and the response question on the other. Each item had a single matching code, which was unique to each student. The students were instructed not to open the envelope. Students were then asked to silently read page 1 and then turn it over to page 2 and respond. Students were further instructed that upon finishing they were to continue looking ahead per exam rules, and they were not to open the envelope. When students finished, the experimenters collected the sheets of paper leaving the envelopes with the students. Next the experimenter displayed the selected codes on the projector, and the remaining students were instructed to set their non-matching envelopes on the table, and to leave the room.

Next, selected students were pulled aside one by one to confirm their answers and check their unique identification code. After confirmation, they were individually told to open their envelopes.

Students in the alone treatment were individually walked downstairs to the entrance hall by an experimenter while another experimenter waited for them at the entrance. After passing in between the lion statues, the students in the alone treatment were asked to fill in a receipt form and were paid according to the amount revealed in their envelopes. The students were then told they were free to go. Enough time was given to each student to complete these tasks before the next student was walked downstairs to perform his/her task as to not allow students in the control group to be seen passing in between the lions by other students that were going to do the same.

Students in the treatment group repeated the same process as described above, except they were asked to pass together in between the statues, as indicated in their question.

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