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ABSTRACT

Economic agents face many different types of economic incentives when making financial and moral decisions. We provide experimental data from a population that uniquely responds to incentives to lie compared to previously studied populations. We conduct a standard 6-sided die rolling lying study within a population that believes that God has knowledge of all their actions. Within this population, we find that those who attend church frequently appear to refrain from lying while those that do not frequently attend church do lie, but do not disguise their lies like more secular populations. We further explain how our data fits into the theoretical work on lying.

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1. Introduction

That people lie is no surprise. Predicting who will lie and by how much is more complex. If people are willing to dishonestly exploit a situation, will they do so to the fullest extent possible or somewhat less? These questions are important to businesses, governments, and religious groups regarding the people with whom they interact and have implications for optimal institutional design. (Hanna and Wang, 2017) Prior research has shown that groups of individuals are either honest appearing or they engage in a form of disguised (partial) lying. In this paper, we present an experimental study with the first population that does not appear to disguise lying.

Our study builds upon lying studies such as Fischbacher and Föllmi-Heusi (2013). Earnings are based on self-reported rolls of a standard 6-sided die conducted in private. Significant deviations from a uniform distribution of reported values are interpreted as evidence of lying. Fischbacher and Föllmi-Heusi (2013) found that in aggregate, subjects report the highest paying number at a frequency which significantly exceeds 1/6, which they interpret as significant evidence of lying within the population. Interestingly, they also observe significant over-reporting of the second highest paying number, which they interpret as an attempt to "disguise" lying from the experimenter. These findings have been widely replicated, and a variety of explanations for this behavior have been offered. See Abeler et al. (2018) for a detailed survey and meta-analysis of the literature.

A small number of studies have found both reduced lying and insignificant evidence of lying in religious populations (see Shalvi and Leiser 2013, Arbel et al. 2014, Bar-El and Tobol 2017). In these religious populations, lying continues to be disguised. Utikal and Fishbacher (2013) find in a subject pool of nuns significant over-reporting of the lowest earning and second lowest earning die rolls. We believe our study to be the first to find significant evidence of lying without an accompanying attempt to disguise it.

We conducted a die-rolling experiment at a large U.S. faith-based University in which 47.3% of our sample report attending church at least once per week. Although this proportion vastly exceeds what might be expected at most U.S. universities, the 2014

Religious Landscape Study (Pew, 2014) reports that 36% of the US population attends church weekly. We attribute the lack of disguised lying in our study to the participants' self-reported belief that God "Always watches our actions". If subjects believe that God is watching their actions, any misrepresentation of a die roll, large or small, is equally onerous. Further we find that undisguised lying is inversely correlated with the frequency of church attendance. We find no evidence of lying in subjects who attend services at least weekly.

2. Experimental Methods and Procedure[1]

All participants roll a standard 6-sided die twice in private behind a visually isolated divider. Subjects receive payment of $0.40 per number reported in one roll ($0.40 for a roll of '1' and $2.40 for a roll of '6') and $0.10 per number reported in the remaining die roll.[2] Subjects complete a survey of basic demographics, frequency of church attendance, and whether subjects perceived that God "always", "sometimes", "rarely", or "never" watches our actions. We randomize over whether subjects are given the survey before or after reporting their die rolls, lest a reminder of belief in divine omniscience affect behavior. (Ariely, 2008) Summary statistics are presented in Table 1.

Table 1: Summary Statistics

VARIABLES	mean
Male	0.698
Caucasian	0.585
God Watches	0.925
Attends Church Frequently	0.396
Observations	53

All 53 subjects were recruited in person outside of university cafeterias or libraries and made decisions on Ztree (Fischbacher, 2007). Subjects completed the experiment and survey in around 10 minutes. All earnings were paid in cash.

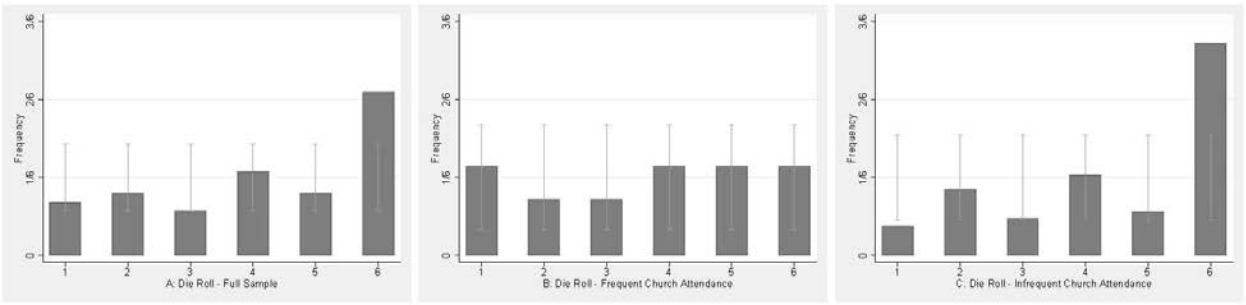
[1] Relevant instructions and survey questions are included in the supplemental materials online.

[2] The decision task also included a real effort task and a risk elicitation task. Decisions in these tasks are not relevant for the current paper and are omitted.

3. Results

From Table 1, our sample almost universally (92.5%) agrees that God is always watching their actions. This would imply that even behind a visually isolated divider, these subjects believe God has complete knowledge of what they do. Figure 1 reports the frequency of self-reported outcomes for our entire subject pool in Panel A and by frequency of church attendance in Panels B and C. 95% confidence intervals around the expected frequency of 1/6 are indicated. Within the entire subject pool, the highest paying outcome is reported at over twice its expected frequency (two-tailed binary test of mean = 1/6; $p<0.001$), with all other outcomes occurring within a 95% confidence interval of their expected frequency. We interpret this as evidence that within our more religious subject pool, most of whom report believing that God is always watching them, there is evidence of lying "big" but with no concealed lying. This is in sharp contrast to the disguised lying commonly found in more secular subject pools (see Abeler et al. 2018). Our sample either "sins big" or they appear to not lie at all (e.g. they "go home"). No attempt appears to be made to disguise a lie, presumably because such actions reduce the benefit of the lie without reducing the cost (e.g. they believe God knows that they have lied.) Results are indistinguishable whether the survey was administered before or after reporting die rolls. (two-tailed Mann-Whitney, $p>0.1$).

Figure 1: Histograms of Die Rolls



Notes: 95% Confidence Interval around the expected mean of 1/6 indicated in each column.

However, we do see a significant effect related to frequency of church attendance. Panel B reports frequencies for the 39.6% of our sample that attend church frequently (at least once per week) and Panel C the 60.4% that do not. Die rolls by frequent church attenders

occur within the 95% confidence interval and are indistinguishable from random die rolls. However, infrequent church attenders report rolling a 6 (the highest paid roll) at significantly more than expected (45.3%; $p<0.0001$) and a 1 significantly less often than expected ($p<0.05$), which we interpret as significant evidence of lying. Self-reported rolls of 5 and 4 are within the 95% confidence interval for infrequent church attenders. We interpret these results as evidence that infrequent church attenders, most of whom state a belief that God is watching their actions, are willing to lie but do not attempt to disguise it.

We find additional evidence that the distributions of self-reported die rolls differ by frequency of church attendance. A Kruskal-Wallis test rejects the null hypothesis of frequent and infrequent church attenders' self-reported rolls being drawn from the same distribution ($p<0.05$). Infrequent church attenders report an average roll of 4.45, while frequent church attenders report a significantly lower 3.64 (two-tailed Mann-Whitney, $p<0.05$). Infrequent church attenders report rolling 6 (highest payout) in 45.3% of rolls versus 19.0% for frequent church attenders (MW, $p<0.01$). The average sum of both rolls for infrequent church attenders is 8.91, marginally higher than that of frequent church attenders at 7.29 (MW, $p<0.1$). In expectation, only 2.8% of subjects should report two die rolls of 6 for maximum payout. 21.9% of infrequent church attenders report this outcome, vastly exceeding the expected value of 2.8 (binary test $p<0.001$). In contrast, 4.8% of frequent church attenders report this outcome, which does not significantly differ from expectations, (binary test, $p>0.1$) and marginally less often than infrequent church attenders (MW, $p<0.1$).

Table 2: Regression Results

VARIABLES	Linear RE Die Roll	Probit RE Report 6	OLS Sum of Rolls
High Payoff	-0.2593	-0.3073	
	[0.215]	[0.183]	
Roll First	-0.2593	0.0694	
	[0.215]	[0.576]	
Religion Survey First	-0.2534	0.0278	-0.5068
	[0.245]	[0.525]	[0.249]
Attends Church Frequently	-0.8366**	-0.8186**	-1.6733**
	[0.007]	[0.018]	[0.007]
Male	0.6304	0.3192	1.2609
	[0.947]	[0.786]	[0.939]
Caucasian	-0.2189	-0.5714	-0.4378
	[0.266]	[0.052]	[0.260]
Observations	106	106	53
Overall R-squared	0.085		
Pseudo R-squared		0.097	
R-squared			0.143

Notes: Randomized p-values are reported in square brackets. Each value is the proportion of coefficients from 10,000 randomly generated draws are less than the indicated coefficient and estimate the likelihood of the observed results occurring through random sampling.

*** p<0.005 or p>0.995, ** p<0.025 or p>0.975, * p<0.05 or p>0.95

We further explore our results with regression analysis, reported in Table 2. First, we specify each reported roll as a function of explanatory variables and a subject-level random effect. In this specification (column 1), we find that frequent church attenders report lower die rolls at a 5% level. Using a probit with subject-level random effects, we find in column 2 that frequent church attenders are significantly less likely to report a "6". Finally, in column 3 we find that the sum of die rolls reported by frequent church attenders is significantly smaller.

The statistical reliability of regression results in experimental studies is sometimes called into question because of the small sample sizes frequently used. In Table 2, we report the statistical significance of our estimated coefficients using randomized inference. These techniques allow comparison of the behavior of our experimental subjects with the distribution of 10,000 computer generated repetitions of our experiment with honest reporting of die rolls. See Athey and Imbens (2017) and Paz and West (2019).

4. Discussion and Conclusion

We find that a subset of our experimental subjects who report believing that God is always watching their actions are often still willing to lie, but do not attempt to disguise it in contrast to behavior observed in less overtly religious samples. This is consistent with the "Reputation for Honesty" model of lying in Abeler et al. (2018) in that a population who believes God is always watching is in a state of perfect observability and thus those who lie should do so in full. Our data suggests a heterogeneity in the utility for reputation for honesty, in which those who attend church less frequently appear to have a lower threshold to trade their reputation for monetary gain. Alternatively, our results could be explained with a fixed cost for lying in this population that varies not with the degree of lying but instead with the extent to which they practice their faith.

This is the first laboratory population in the economics literature that has been observed to lie without attempted obfuscation. Frequent church attending subjects, who appear statistically honest, pay significant opportunity costs to attend church regularly. Such costly sacrifices have been shown to be an efficient economic mechanism to separate cooperators from free-riders in public goods provision environments (Aimone et al. 2014). Similarly, our study contributes to the general work on religiosity and economic decision making, such as Benjamin, Choi, and Fisher (2016), who examine the effect of religious identity across a broad array of economic environments.

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