Because I (don't) deserve it: Entitlement and lying behavior*

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Abstract

This paper studies, theoretically and experimentally, whether the entitlement effect created by deservingness affects the willingness to lie. In a laboratory experiment, we compare the lying behavior of high-endowment participants with low-endowment participants. In one treatment, the allocation of the endowment is decided by participants' effort, and in the other, it is determined by a random draw. When participants lie to keep money directly determined by their effort, those who receive the high endowment lie more than those who receive the low endowment. In contrast, when income is determined by a random draw, lying is the same regardless of the endowment. These findings are consistent with our model of relative entitlement concerns where less deserving individuals are discouraged from lying because they believe that other individuals are more deserving than themselves.

Keywords: Lying; Dishonesty; Deservingness; Reference points; Psychological game theory.
JEL Codes: C91; D02; D90.

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1 Introduction

In many situations, self-reported private information affects individual income. For instance, when selling a used item, individuals may try to overstate the quality of the product to charge a higher price. This behavior can lead to well-known market failures (Akerlof, 1970) but can be alleviated if sellers are unwilling to lie. One aspect that potentially influences the preference for honesty, in a context as described above, are entitlement considerations. For example, when selling a used car, a seller might think about all of the many months they spent working extra hours to pay back the car's credit installments. This may lead the seller to misreport the car's condition when bargaining with buyers because they feel deserving to retain the fruits of their labor. In this paper, we study whether the individual's perception of deservingness affects lying behavior. We formalize this relation between lying and the entitlement created by deservingness in a model, and we assess it empirically in an experiment that varies the entitlement participants have to an endowment.

Previous experiments show that the proportion of subjects willing to lie is low compared to the neoclassical money-maximizing benchmark (see Rosenbaum et al., 2014; Abeler et al., 2019, for a review of the literature). As a consequence, it has been argued that when designing economic institutions, one should consider those institutions that rely on voluntary truth-telling even if they are not incentive-compatible given that they might be cheaper and easier to put in place (Abeler et al., 2019). This conclusion can be questioned if the decision context is no longer the same as in the typical lying experiment.

In particular, two context variations might change the typically observed moderate lying rates in laboratory experiments. First, previous experiments on lying are mainly focused on how individuals lie to gain extra money; however, there may be cases where it is possible to lie to avoid a loss, in which case loss aversion may decrease the cost of lying. Second, even in the experiments in which it is possible to lie to avoid a loss (e.g., Schwartz Cameron et al. (2008); Grolleau et al. (2016); Charness et al. (2018); Garbarino et al. (2019)), subjects' endowment is "manna from heaven". However, there might be cases where lying behavior is crucially related to the endowment origin. For instance, a person's income tax bill is based on self-reported income; therefore the effort invested into earning the income might influence lying behavior through a feeling of entitlement.

In this paper, we consider a setting where individuals can lie to keep a part of their income that they earned through effort. We derive a model in which the source of the endowment influences lying. In the model, individuals compare the payoff from lying and truth-telling with a payoff they think they are entitled to. Individuals hold meritocratic entitlement concerns (i.e., they feel deserving of their income if they put in relatively high effort to earn it); having deserved their income makes them more likely to lie to keep it relative to individuals who exerted less effort. Crucially, entitlement considerations are formed relative to the effort that other people put in, and this can then lead to a disentitlement effect. For example, an individual who exerted low effort might be content with losing part of their income because they would feel guilty to receive a payoff that is higher than the payoff of an individual who exerted more effort.

In our experiment, we disentangle entitlement concerns from income effects and loss aversion. The possibility of exogenously manipulating the endowment's source allows us to establish a causal relation between deservingness and lying. Our experimental design has two treatments, main treatment (DESERVE) and control treatment (CONTROL), in which we vary the connection between participants' effort and endowment. In both treatments, participants have to perform two tasks. In the first task, participants have to encrypt words (Benndorf et al., 2014). In DESERVE, those among the top half of performers in the encryption task receive a high endowment. In contrast, participants among the lower half of performers receive a low endowment. The second task follows the Fischbacher and Föllmi-Heusi (2013) paradigm. Participants have to report the outcome of a six-sided die that is rolled in private. Then, from an envelope with their first task's earnings, they have to return the value in euros equal to their reported number.

Given that our primary interest is the lying behavior of people more deserving compared with those less deserving, we first compare participants with a low endowment and participants with a high endowment in DESERVE. Then, to rule out competing explanations of the results in DESERVE, we use CONTROL, where we remove the connection between participants' performance and endowment. In particular, in CONTROL, participants face the same two tasks as in DESERVE, but we disconnect both tasks by randomly allocating envelopes with either low or high endowments before the die roll task. We also inquire whether participants lie more to keep money that they earned through effort rather than by luck.

We find that when participants' effort determines their endowment, those who receive the low endowment lie less than those who receive the high endowment. The effect we estimate amounts to -0.22 standard deviations, which is a meaningful quantitative effect when compared to treatment effects found in the literature. For example, the effect is roughly twice the size of the treatment effect of going from an observed to an unobserved lying game, as reported by Gneezy et al. (2018). The result is mediated by participants' beliefs about their rank in the encryption task and does not hold for the control group. While more positive beliefs about their relative performance in the encryption task are positively correlated with lying when the endowment is earned, beliefs are uncorrelated with lying when the endowment is allocated randomly. The main treatment effect shows that bottom performers in DESERVE lie less than top performers but top performers do not lie more relative to the random endowment. The difference in lying behavior between treatments seems to be driven by people who feel they are non-deserving being less willing to lie. Our results suggest that deservingness influences lying behavior because it creates an entitlement concern that makes lying more costly for the low-performing group. Our results are in line with our model and particularly stress the role of guilt in shaping entitlement concerns.

2 Related Literature

Our study contributes to three main branches of literature. First, our paper relates to the research concerning the entitlement effect created by an earned endowment. Cherry et al. (2002) and List (2007) show that proposers become more selfish in the dictator game when they earned their endowment. This result has been replicated by Oxoby and Spraggon (2008), who also show that dictator giving becomes more generous when receivers work for the dictator's endowment. Recently, Kassas and Palma (2019) show that the entitlement effect can arise relatively subtly. In their experiment, the role of dictator and receiver is allocated by whoever rolls the higher number on a die. In one treatment, subjects simply roll a die that was assigned to them. In a further treatment, subjects can choose the physical size of the die and the location they roll it to, which creates strong enough entitlement concerns for winners to reduce dictator giving even though the role allocation was random in both treatments.

Results in the ultimatum game have been more mixed when participants compete for the proposer role. Although Hoffman et al. (1994) initially show that proposer behavior becomes less generous, this result has been put to question in a recent study by Demiral and Mollerstrom (forthcoming), who fail to replicate the original results. The combined evidence from Cherry et al. (2002), Frohlich et al. (2004), List (2007), Cappelen et al. (2007), Oxoby and Spraggon (2008), and Barr et al. (2015) suggests that, in variants of the dictator game and ultimatum game, many subjects follow a meritocratic norm and allocate money proportional to effort. In this paper, we present experimental evidence showing the earned endowment effect in the lying domain.

Second, our paper contributes to the literature on lying (Shalvi et al., 2011; Fischbacher and Föllmi-Heusi, 2013; Kajackaite and Gneezy, 2017; Gneezy et al., 2018; Abeler et al., 2019), specifically, the study of lying in loss domains. Schwartz Cameron et al. (2008), Grolleau et al. (2016), and Garbarino et al. (2019) present evidence that suggests that loss domains may increase the willingness to lie given that loss aversion is present, a result that has not been found by Charness et al. (2018), who also study loss aversion in a lying setting. Our experimental design does not test the impact of loss frames in lying directly, yet it disentangles pure loss aversion from deservingness. We vary the source of the endowment exogenously; in one case, the endowment is determined by luck and in the other by effort. This design allows us to assess the impact of deservingness in lying, controlling for income, loss aversion, social preferences, and ability.

Third, further closely related papers are concerned with the relation between effort provision and cheating. Mazar et al. (2008) study how much people lie about their performance in a matrix task, and Gravert (2013) reports results from an experiment in which participants are more willing to steal money after absolving a matrix task than after rolling a die. Kajackaite (2018) presents a laboratory experiment in which participants have to report the outcome of a random draw or a matrix task and finds that lying is more pronounced when subjects lie about luck rather than effort. In our experiment, participants can only lie about a random draw. The role of the real effort task is to determine the endowment in DESERVE and thus to create the entitlement in this treatment. Therefore, unlike previous research, our setting assesses the causal effect of exerted effort on lying to keep earned money instead of lying about effort or stealing after exerting effort. Our experiment allows us to investigate the treatment effect of entitlement (how is lying about earned income different from lying about luck?) and the intensive effect of entitlement (do participants who performed better in the effort task lie more than participants who fared worse?).

3 Model

We formally investigate the effect of entitlement concerns on lying behavior in a simple binary lying game as in Abeler et al. (2019). We introduce entitlement concerns into the lying game using the framework developed by Gill and Stone (2010, 2015), who study the impact of entitlement concerns on real effort provision in tournaments and group tasks. The key innovation of their theoretical framework is that they incorporate entitlement concerns as reference points about deserved income into a utility framework.[1]

In our model, individuals are endowed with an initial income that depends on their performance in a preceding real effort task. They then have the possibility to lie to keep a part of that income. Individuals evaluate their entitlement by forming a reference income that they compare to the actual final payoff they would obtain from lying and from truth-telling. Individuals are assumed to hold meritocratic norms, which we capture by assuming that individuals hold a higher reference point if they think that they performed well in the task relative to their competitors. If they get paid less than their reference point, individuals will incur a psychological loss because they are upset or disappointed by receiving less than they feel entitled to. On the contrary, if individuals receive more money than they think they deserve,

[1] To the best of our knowledge, theirs is the only framework that formally models entitlement concerns. An alternative theoretical approach would be to model individuals who are inequality averse net of effort costs. Gill and Stone (2015) show that their model nests this alternative as a special case.

they feel guilty because, as judged by their norms, they are not deserving of the extra money.[2] Individuals actively seek to avoid disappointment and guilt, and these feelings therefore influence lying decisions. An individual with a relatively high reference point gains an extra incentive to lie if lying provides them with a payoff that is closer to their reference income, whereas an individual with a relatively low reference point is discouraged from lying because lying would provide them with more money than they think they deserve.

In what follows, we provide a simple linear adoption of the framework developed by Gill and Stone (2015) to a lying setting. The population consists of a continuum of individuals $i \in [0,1]$ who are entitlement concerned. Entitlement is captured by including the desert function

$$-D(w_i - r_i)$$

into the utility function, where r_i is a reference point and w_i is the final payoff. To capture the different forms that entitlement feelings can take, desert is a piecewise (and in our setting piecewise linear) function of the form

$$D(w_i - r_i) = \begin{cases} \lambda|w_i - r_i| & \text{if } w_i - r_i < 0 \\ \gamma|w_i - r_i| & \text{if } w_i - r_i \geq 0. \end{cases}$$

In situations where individuals receive less than their reference point, we say that they experience a loss. Conversely, we say that individuals experience a gain if they receive more than their reference point. The utility weight of losses and gains is captured by two non-negative parameters, λ and γ, respectively. Note that the entitlement term enters the utility function negatively and is therefore always maximized when the individual earns precisely as much as they feel entitled to (i.e., if $w_i = r_i$). This particular form of the desert function rules out the possibility that individuals may sometimes enjoy earning more than they deserve.[3] We focus on the case where it is costly for individuals if they receive more than they deserve because it best describes meritocratic entitlement concerns, which we are interested in studying.

As a benchmark setting to which we compare lying with entitlement concerns, we later consider a setting where individuals lie to keep windfall endowments. We thus generate two

[2] Note that this understanding of guilt is different from models of guilt aversion, which define guilt as the aversion to violate the expectation of a second player (Charness and Dufwenberg, 2006). In these models, guilt depends on the individual's beliefs about the second player's expectation (and thus on their second-order belief). Instead, in the terminology of Gill and Stone (2015), individuals experience guilt if they violate their belief about their own deserved income, which is a function of their performance and the performance of all other players. Guilt in this sense is evoked by a violation of the individual's desire to live in a meritocratic world.

[3] In the words of Gill and Stone (2015), this alternative specification describes a situation where individuals experience elation, which can be captured by assuming that $\gamma < 0$. All our theoretical results would carry through to the elation case as long as we assume that individuals are weakly loss averse ($-\gamma \leq \lambda$).

sets of hypotheses from the model. The first set compares the lying behavior of individuals who exerted effort but who differ in the degree of entitlement. The second set of hypotheses compares the lying behavior of individuals who lie to keep earned incomes with the behavior of individuals who lie to keep random endowments.

Game: Individuals are endowed with an initial income based on their performance in a competition. The top half of performers receive endowment ω_τ, and the bottom half receives ω_β. Top performers get paid more than bottom performers, and we assume $2\omega_\beta > \omega_\tau > \omega_\beta$ so that the payoff difference between both performance groups is not too large. We consider the wage received by a subject as a random process outside of the model with $Pr(\omega_i = \omega_\beta) = \frac{1}{2}$. After that, individuals form an average performance belief about their relative rank in the task, ρ_i, which we model as a random variable that is drawn from a distribution $H(\rho \,|\, \omega)$. Throughout this section, we work with ranks that are normalized between zero and one, with $\rho = 0$ being the bottom rank, $\rho = 1$ the top rank, and $\rho = \frac{1}{2}$ the middle rank.

Beliefs depend on the initial payment (ω_i) to reflect that individuals are paid conditional on their performance being either among the top or the bottom half of all individuals. We assume that individuals correctly incorporate the conditionally of the payment, namely that $H(\rho \,|\, \omega_\beta)$ has support between $[0, \frac{1}{2}]$ and $H(\rho \,|\, \omega_\tau)$ has support between $[\frac{1}{2}, 1]$. This assumption ensures that individuals endowed with a high income believe they are in the top performer group, while individuals with a low initial income believe that they are in the bottom performer group. Note that we do not impose that individuals hold correct beliefs, as they might, for example, be overconfident about their performance in the real effort task. We do, however, impose an assumption on the belief distribution of the form $H(\rho - \frac{1}{2} \,|\, \omega_\beta) \geq H(\rho \,|\, \omega_\tau)$. In words, we assume that beliefs of top performers are at least as optimistic as the beliefs of bottom performers within their respective performance groups.[4]

After forming performance beliefs, the lying game starts. Individuals draw a state $y_i \in \{\hbar, \ell\}$ with $\mathrm{P}(y_i = \ell) = \frac{1}{2}$, which is independent of their belief ρ_i and initial payment ω_i. They then send a report $x_i \in \{\ell, \hbar\}$. Reporting $\hbar$ (ℓ) results in a material loss of size $\pi_\hbar > 0$ ($\pi_\ell > 0$), and reporting ℓ is more costly than reporting $\hbar$ ($\pi_\ell > \pi_\hbar$). We further impose that the payoff difference between the states is small compared to the difference in initial endowments ($\omega_\tau - \omega_\beta > \pi_\ell - \pi_\hbar$) and the lying game payoffs are also relatively small compared to the initial payments ($\pi_\hbar + \pi_\ell < \omega_\beta$).[5] When the report differs from the draw ($x_i \neq y_i$), the

[4]This assumption can be micro-founded by noting that a population of Bayesian individuals who hold, on average, a correct prior would react to the information of being either in the top or bottom half by updating their belief in the direction of the very top (bottom) rankings, thus creating posterior average rank beliefs consistent with the assumption holding with strict inequality.

[5]The parameter restrictions ensure that initial payments are large enough to noticeably influence the lying decision, as too large payoffs in the lying game would restrict the range of beliefs for which individuals experience psychological gains and losses. The parameter restrictions made in this section are in line with the payoffs chosen in the actual experiment.

individual is a liar, while they tell the truth otherwise.

Lying is costly for individuals who might be morally committed to telling the truth. Each agent has a lying cost c_i drawn from a distribution $F(c)$, which is strictly increasing with full support on $[0, C]$, where $C > 0$. Lying costs are distributed independently of y_i and ρ_i.

To summarize, an individual's type can be denoted by (y_i, c_i, ρ_i). y_i and c_i denote a random state and the lying cost, which are the standard ingredients to a lying game (see, e.g., Gneezy et al. 2018). Entitlement concerns further require differences in relative effort considerations, which we model here by introducing individual rank beliefs, ρ_i. By reporting state x_i, individuals earn a final material payment $w_i = \omega_i - \pi_{x_i}$. In addition to that, individuals experience further psychological gains or losses depending on lying costs and entitlement considerations.

Preferences: We assume that individuals have an additive utility function of the form

$$u_i(\omega_i, y_i, c_i, r_i, x_i) = \omega_i - \pi_{x_i} - 1_{x_i \neq y_i} c_i - D(\omega_i - \pi_{x_i} - r_i) \tag{1}$$

that they will seek to maximize. They will thus lie if $u_i(\omega_i, y_i, c_i, r_i, x_i \neq y_i) \geq u_i(\omega_i, y_i, c_i, r_i, x_i = y_i)$. For all results that follow, we make the following assumption on the desert function:

Assumption 1. $\gamma, \lambda < 1$.

This assumption ensures that entitlement motives never become too strong and lead to an extreme behavior where individuals are willing to burn money because they feel guilty to have earned it. One direct implication of the assumption is that individuals never lie downwards:

Observation 1 (No downwards lying)**.** *Under Assumption 1, no individual drawing state $\hbar$ reports ℓ.*

The above observation allows us to focus the analysis on the decision of individuals who draw the low state. The formal proofs to this observation, and to all of the following results, are included in the Appendix.

Reference point function: We now put more structure on the reference point function that allows us to derive testable predictions for the experiment.

Assumption 2 (Reference point)**.** *Let $\rho_i \in [0, 1]$ be the own rank belief and $w^e > 0$ be the individual's belief about the average final payment to all individuals. The reference point is a mapping $r : [0, 1] \times \mathrm{R}_+ \to \mathrm{R}_+$*

(i) $\frac{\partial r(\rho_i, w^e)}{\partial \rho_i^e} > 0$ *and* $\frac{\partial r(\rho_i, w^e)}{\partial w^e} \geq 0$

(ii) $r(\rho_i = \frac{1}{2}, w^e) = w^e$

(iii) $r(\rho_i = 0, w^e) = 0$ *and* $\frac{\partial^2 r(\rho_i, w^e)}{\partial \rho_i^2} \geq 0$.

Part (i) says individuals who hold higher beliefs about their performance feel entitled to a higher income and that the reference income increases in the belief about the average final payoff. In part (ii), we assume that individuals who think they hold the average rank also want to claim the average income. Taken together, the first two parts capture the "each according to their abilities" tenet of meritocratic norms and is formulated in a similar form in Gill and Stone (2015).[6] Part (iii) puts restrictions on the range and curvature of the reference point function, which is discussed in greater detail below.

Some departures in our definition of the reference point from Gill and Stone (2015) are worth mentioning. First, we assume that relative effort considerations can be captured by the performance belief alone, leaving aside considerations about the distribution of the absolute effort provided by all individuals. We believe that this makes sense in the tournament setting that we are interested in studying because the initial payment is exclusively based on relative performance. A second departure is that the reference point is defined over beliefs, which makes the problem we study a psychological game, as defined by Geanakoplos et al. (1989) and Battigalli and Dufwenberg (2009) (in psychological games, beliefs are directly payoff relevant). Throughout the analysis, we employ the extended sequential equilibrium notion from Battigalli and Dufwenberg (2009) as an equilibrium concept that requires that, in equilibrium, (i) all individuals maximize their utility and (ii) all individuals hold correct beliefs about other individuals' behavior.

It is useful to look at the mechanisms through which entitlement concerns affect lying behavior with an example. Think of an individual who drew ℓ and holds a belief that is just slightly below $\frac{1}{2}$. This individual received a low initial income but believes that they are among the best performers who received a low income. This belief implies a reference point of $r_i \approx w^e$. The individual will thus lie if

$$\omega_\beta - \pi_\hbar - c_i - D(\omega_\beta - \pi_h - w^e) \geq \omega_\beta - \pi_\ell - D(\omega_\beta - \pi_\ell - w^e). \tag{2}$$

The parameter assumptions ensure that the individual will always experience disappointment regardless of whether they lie or not. To see this, note that in equilibrium w^e can take on values between $\frac{\omega_\tau + \omega_\beta}{2} - \frac{\pi_\hbar + \pi_\ell}{2}$ (no one lies) and $\frac{\omega_\tau + \omega_\beta}{2} - \pi_\hbar$ (everyone who draws ℓ lies). We assume that the payoff difference from the lying game is relatively small ($\omega_\tau - \omega_\beta > \pi_\ell - \pi_h$), and this ensures that $w^e > \omega_\beta - \pi_\hbar$ even if no one lies. Intuitively, lying provides the individual with only little extra income; therefore they will, even after lying, consider themselves to be

[6] They assume the reference point increases in the own effort provided and that it equals exactly the average payment if everyone provided the same effort.

deserving of a larger income and hence feel disappointed. We can rewrite equation 2 as

$$\underbrace{\pi_\ell - \pi_\hbar}_{\text{material gain}} + \underbrace{\lambda(\pi_\ell - \pi_\hbar)}_{\text{relative entitlement gain}} \geq \underbrace{c_i}_{\text{intrinsic lying cost}} .$$

The individual will lie if the sum of the material and the relative entitlement gain from lying is higher than the intrinsic lying cost. As lying reduces the discrepancy between earned and deserved income, the individual will feel less disappointed by lying. This gives them, in addition to the material incentive, a further psychological incentive to lie.

The situation is different for an individual with a belief slightly above $\frac{1}{2}$ (i.e., an individual who believes they were among the worst top performers). An individual with such a belief who drew ℓ will lie if

$$\underbrace{\pi_\ell - \pi_\hbar}_{\text{material gain}} + \underbrace{D(\omega_\tau - \pi_\ell - w^e) - D(\omega_\tau - \pi_\hbar - w^e)}_{\text{relative entitlement change}} \geq \underbrace{c_i}_{\text{intrinsic lying cost}} .$$

Entitlement considerations can reduce this individual's incentive to lie. Lying will provide them with a high final payment as compared to the average income, especially if relatively few individuals lie in equilibrium. They will feel guilty, as the they feel undeserving of such a high relative income. The prospect of feeling guilty thus reduces their lying incentive.

Because it is discontinuous, the payment scheme can thus generate very different entitlement considerations between individuals who count themselves lucky to have received the high payment and those who feel they barely missed it, even though they do not differ greatly in their beliefs about their relative performance.

Whether individuals feel disappointed or guilty depends on their reference point. If they have a reference point that is very low compared to their endowment, they do not even feel that they deserve to receive the money they would earn when telling the truth. Over a medium range of reference points, individuals will feel disappointed by telling the truth but will feel guilty if they lie: while they think that they should receive more than the income from telling the truth, lying would increase their income by too much. Individuals with the highest reference points will be disappointed by telling the truth and lying, as even lying does not give them the money they think they deserve. Hence, they will see the largest increase in the incentive to lie. In the following, we define critical performance belief values that determine whether individuals feel disappointment or guilt from lying and truth-telling.

Definition 1. *Define belief threshold points $\rho^1(\omega_i)$, $\rho^2(\omega_i)$ as the solution to equations*

$$r(\rho^1(\omega_i), w^e) = \omega_i - \pi_\ell$$
$$r(\rho^2(\omega_i), w^e) = \omega_i - \pi_\hbar .$$

Individuals in state ℓ with a belief smaller than $\rho^1(\omega_i)$ feel guilt from lying and truth-telling, individuals with a medium belief between $\rho^1(\omega_i)$ and $\rho^2(\omega_i)$ feel guilt from lying and disappointment from truth-telling. Individuals with a belief higher than $\rho^2(\omega_i)$ feel disappointed from truth-telling and from lying.

When comparing the lying behavior of top performers with the lying behavior of low performers, the range and curvature of the reference point function (part (*iii*) in Assumption 2) become essential. Intuitively, if the range of the reference point function is concentrated around w^e, the model would predict that low performers only experience disappointment, while high performers always feel guilt from lying. To generate a wide variety of behavioral types, the assumption about the reference point taking a lower bound at zero together with the convexity assumption ensures that the belief threshold points are interior so that some low performers always feel more entitled to lie than others. Convexity of the reference point function also has an intuitive behavioral implication.

Consider two individuals with different endowments who hold the same relative rank belief within their performance group.[7] By convexity, a sufficient, but not necessary, condition for the bottom performer to experience guilt from an action is that the top performer feels guilty from the same action. For example, if a top performer feels guilty when they lie, then the bottom performer with the same relative rank belief will, for sure, also feel guilty. There are, however, cases where the top performer feels disappointment from lying while the bottom performer with the same relative rank feels guilty. The opposite holds for disappointment. That the bottom performer feels disappointment from their action is a sufficient, but not a necessary, condition for the top performer to also feel disappointed from performing the same action. This leads to observation 2, namely that top performers are more likely than bottom performers to feel disappointed and are less likely to feel guilty.

Observation 2. $\rho^1(\omega_\beta) + \frac{1}{2} > \rho^1(\omega_\tau)$ *and* $\rho^2(\omega_\beta) + \frac{1}{2} > \rho^2(\omega_\tau)$.

We have now developed a setting to study the effect of entitlement concerns on lying. We conclude with a final observation about equilibrium lying behavior before we apply the model to derive specific behavioral predictions for the experiment.

Observation 3. *With entitlement concerns, lying is characterized by a threshold lying cost*

[7] While we assume a continuum of individuals, this is best illustrated by assuming a finite number of 24 individuals. Splitting them in the top and bottom performers means that top performers hold rank beliefs between 1–12 and bottom performers hold beliefs between 13–24. Individuals with rank beliefs 8 and 20 hold the same relative rank belief, as they both place themselves on the eighth rank within their performance group.

function

$$\hat{c}(\pi_l, \pi_h, \rho_i^e, w^e, \omega_i, \lambda, \gamma) = \begin{cases} \pi_\ell - \pi_h - \gamma(\pi_\ell - \pi_h) & \textit{if } \rho_i \leq \rho^1(\omega_i) \\ \pi_\ell - \pi_\hbar - (\gamma + \lambda)[\omega_i - r(\rho, w^e)] + \gamma\pi_\hbar + \lambda\pi_\ell & \textit{if } \rho_i \in (\rho^1(\omega_i), \rho^2(\omega_i)) \\ \pi_\ell - \pi_\hbar + \lambda(\pi_\ell - \pi_\hbar) & \textit{if } \rho_i \geq \rho^2(\omega_i). \end{cases}$$

Individuals in state ℓ with a lying cost that is weakly smaller than $\hat{c}$ lie, while all other individuals tell the truth.

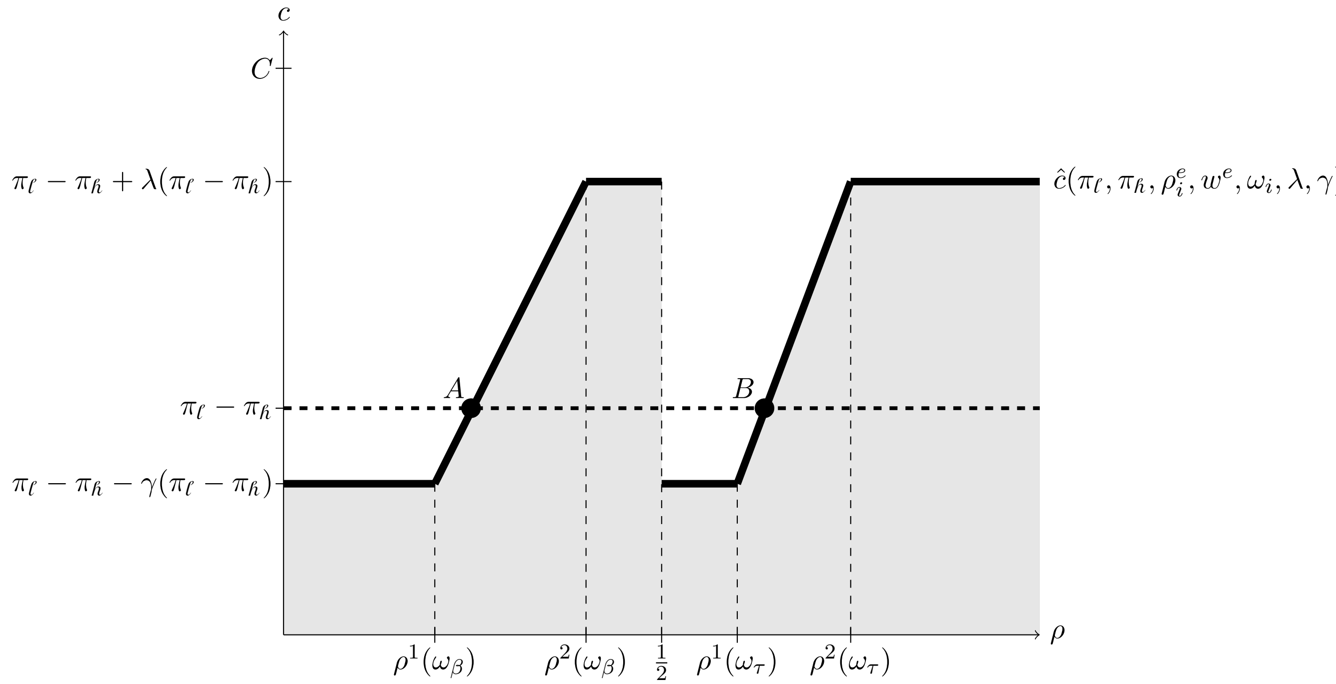
Figure 1 displays the equilibrium threshold lying function. Individuals will lie if their type falls into the grey-shaded area below the function graph. As the function is increasing within performance groups, individuals become more likely to lie if their performance belief is high relative to other individuals in the same income group. Intuitively, individuals with relatively high reference points are less likely to feel guilty from lying and are more likely to feel disappointed with the income they obtain from truth-telling, which then generates a positive relation between performance beliefs and lying.

As a comparison, the dashed horizontal line in Figure 1 gives the threshold lying cost without entitlement concerns. In this benchmark case, individuals lie whenever the material benefit from lying is higher than their lying cost. There are two performance beliefs for which the threshold lying cost is identical with and without entitlement concerns, one among the bottom and one among the top performers. In the figure, they are situated at the intersections of the dashed horizontal line and the threshold function. Bottom (top) performers with beliefs to the right of point A (B) in the figure are more likely to lie with than without entitlement concerns, while the bottom and top performers to the left of the respective intersections are less likely to lie.

In the next section, we use the model to generate predictions for the experiment. The most considerable difference between the model and the experimental setup is that we opt for a six-states lying game in the experiment but only provide formal proofs for a game with two states. Adding more states would not qualitatively change the analysis: in most lying models, the lying cost mainly affects the extensive margin (whether to lie or not) and has little effect on the intensive margin (how much to lie). Thus, the binary lying game can be seen as a reduced-form version of a more general model with fixed lying costs where we, for analytical convenience, abstract from further factors that influence the lying decision but do not necessarily interact with entitlement concerns, such as reputational costs (see Gneezy et al. (2018) and Khalmetski and Sliwka (2019) for more general models).[8]

[8] Dufwenberg and Dufwenberg (2018) also provide a general model, but without intrinsic lying costs, and as such it is not directly comparable.

Figure 1. Equilibrium lying behavior with entitlement concerns.



4 Experimental Design

4.1 Deserved Endowment

Our experiment consists of two parts: a real effort task and a die roll game. At the beginning of each session, participants perform an encryption task in which they have to encode a three-letter combination into numbers (Benndorf et al., 2014). Before doing the encryption task for money, all participants take part in a trial period, where they must encrypt ten combinations of words as practice. After the trial period, participants have eight minutes to encrypt as many words as possible. Their earnings in the task depend on their performance relative to other participants in the session.

After the encryption task, we rank participants according to the number of words they encrypted. In the deserved endowment treatment (DESERVE), those who rank among the top half of performers receive an envelope with 15 euros, and those who rank among the lower half of performers receive an envelope with 10 euros.[9] The encryption task's earnings are handed out in envelopes with 1 euro coins immediately after finishing the task. This procedure allows us to generate a sense of entitlement. Participants do not receive any information about their exact rank during the experiment but only get told whether they belong to the upper or lower

[9]In case of ties at the cutoff rank, we assign all equally ranked participants at the cutoff to the top half of performers.

group of performers.

After receiving the envelope with the money they earned in the encryption task, participants play a modified version of the die roll game (Fischbacher and Föllmi-Heusi, 2013), where they roll a six-sided die in private. After doing so, they are instructed to report the number they got. They lose, from their earned money, the number of euros equal to the number they report. Participants are instructed to return the amount they lost to the experimenter. Thus, the final payoff of participants will consist of the difference between the earnings in the real effort task and the reported die roll.

Arguably, in DESERVE, participants are entitlement concerned because they put effort into getting the money in their envelope. Thus, according to our model, participants with 15 euro envelopes are more likely to be disappointed if they lose money than participants with 10 euro envelopes. Conversely, participants with 10 euro envelopes are more likely to feel guilty when they lie because they are not as entitled to their income. Hence, we hypothesize that the willingness to lie will be lower in the bottom-performance group than in the top-performance group. We provide formal proofs to our hypotheses in the Appendix using the model from the previous section.

Hypothesis 1a. *In* DESERVE*, participants who receive 10 euro envelopes will lie less than participants who receive 15 euro envelopes.*

In addition to the encryption task and the die roll game, we elicit participants' modal beliefs about their rank in the encryption task by paying them 1 euro when they guess their rank correctly. The belief elicitation is made at the end of the experiment, before the post-questionnaire and after participants have completed the real effort and die roll tasks. With this measure, we can assess directly whether the belief about their rank affects the lying decision when the entitlement is present. In particular, we expect that participants who hold more positive beliefs about their performance in the real effort task will lie more and report smaller numbers in the die roll game. Put another way, if relative entitlement concerns are driving the differences between top and bottom performers, those who believe that they, conditional on their income, have a higher rank in the competition will lie more.

Hypothesis 1b. *In* DESERVE*, conditional on receiving the same initial endowment, participants with higher beliefs about their rank will lie more in the die roll game.*

4.2 Control Group

Hypothesis 1a, as such, only provides the insight that deserving the endowment (or not) makes participants more (less) likely to lie. However, one alternative explanation for not rejecting

Hypothesis 1a could be that participants lie more because there is an income effect. In other words, even if there is a difference in the reports of the top performer group and the bottom performer group, the size of the initial endowment could explain this difference. Therefore, to rule out this confounding factor, we add a treatment where we change the source of the endowment but keep all other components of the experiment constant.[10]

In CONTROL, participants also first perform the real effort task. We have them do this to rule out potentially confounding factors, such as the time participants spend in the laboratory before taking part in the die roll task and being able to control for ability sorting.[11] In this first part, participants will obtain a payment of 1 euro if they are in the top performers' group or 0 euros if they are in the bottom performers' group. After the encryption task, we inform the participants whether they were in the top or bottom performers' group, and therefore the informational environment about the relative performance of participants is held constant between treatments.

Once they finish the encryption task, participants draw a ball from a bag that is filled with equal proportions of white and orange balls. Drawing an orange ball endows participants with 15 euros, while drawing a white ball gives them 10 euros. In this treatment, there also are two types of envelopes that are distributed before the die roll game. However, we change the rule for the allocation in comparison to DESERVE. Any differences in lying between treatments should therefore be caused by the different allocation rules. We argue that making the endowment conditional on performance explains the difference between top and bottom performers in DESERVE. As a consequence, if we eliminate this connection, we eliminate entitlement concerns. Hence, in this situation, the lying decision of individuals is independent of their initial endowment, which leads us to the Hypothesis 2a.

Hypothesis 2a. *In* CONTROL*, there will be no difference in lying between participants with a 15 euro envelope and participants with a 10 euro envelope.*

Our central hypothesis is that through the manipulation of the endowment origin, more entitled participants lie more. Therefore, we hypothesize that once deservingness is not present, performance does not affect lying behavior. This hypothesis is motivated by the same intuition in Hypothesis 2a. Moreover, we also hypothesize that the participants' beliefs about their rank

[10] Additionally, other-regarding preferences could generate behavior that is indistinguishable from a classic income effect. Inequality aversion, for example, would predict relatively more lying of low-income participants, as they try to bring the final distribution of incomes closer to the equal split. Therefore, the random allocation in the control treatment also controls for further ways in which unequal incomes could influence behavior and that are unrelated to deservingness.

[11] A different explanation for the entitlement effect would be the social image: if participants work poorly in the real effort task, they might be more honest in the lying game to signal that even if they are low ability participants, they are at least honest. This explanation does not depend on the endowment origin and should thus predict differences in both treatments.

do not have any impact on their reports when they get the endowment by luck. These two hypotheses combined imply that the feeling of being better (or worse) than others in the task will not affect the report because in CONTROL, the real effort and lying tasks are separated from one another.

Hypothesis 2b. *In* CONTROL*, top performers' lying will not be different from bottom performers' lying.*

Hypothesis 2c. *In* CONTROL*, participants' beliefs about their rank will not affect their lying behavior.*

In the previous hypotheses, we presented predictions for within-treatment comparisons. However, deservingness also differs between participants with the same endowment if we compare those who get the endowment by effort and those who get it by luck. According to our model, the differences between participants with the same endowment in DESERVE and CONTROL depend crucially on whether participants feel guilt or disappointment about their income. Disappointed participants are more willing to lie to at least partly compensate for their disappointment. If participants' disappointment is strong enough, then regardless of the endowment, participants with 15 or 10 euro envelopes will lie more in DESERVE than in CONTROL. In DESERVE, participants with 15 euros should feel, on average, more disappointed if they lose part of their income than participants with 10 euros. Thus, we expect them to lie more compared to participants who receive 15 euros in CONTROL.

Hypothesis 3a. *Participants with 15 euro envelopes will lie more in* DESERVE *than in* CONTROL*.*

When guilt motives dominate, participants feel bad if they lie to keep their initial endowment. In contrast to the disappointment case discussed before, participants with 10 euro envelopes in DESERVE are more likely to feel guilty if they lie to preserve some money that they do not deserve compared to participants who earn 15 euros. Hence, we hypothesize that the feelings of guilt will make them less inclined to lie compared to participants with 10 euros in CONTROL.

Hypothesis 3b. *Participants with 10 euro envelopes will lie less in* DESERVE *than in* CONTROL*.*

4.3 Experimental Procedures

We conducted the experimental sessions in December 2018 at the WZB-TU Lab in Berlin. We ran 14 sessions with 330 participants (41.8% female),[12] and participants were recruited

[12]We conducted all the sessions in one week and did not look into the data during that time; therefore the experimental design and number of observations were set and fixed before running it.

Table 1. Summary statistics

	DESERVE	CONTROL	p-value
Age	23.337	23.543	0.682
	(3.981)	(5.045)	
Effort	34.289	33.780	0.396
	(5.722)	(5.135)	
Female	0.398	0.439	0.447
	(0.491)	(0.498)	
N	166	164	330

Note: Standard deviation in parenthesis. P-values from t-tests that test the equality of means are reported in the last column.

via ORSEE (Greiner, 2015). We usually had 24 participants per session (three sessions were conducted with 22 participants because of no-shows) and randomly decided which treatment to run in each session. In Table 1, we provide the summary statistics of gender and age by treatment. The experiment was programmed with z-Tree (Fischbacher, 2007).

In addition to their earnings in the experiment, participants received a 5 euro show-up fee. At the beginning of the experiment, they were told that the experiment would consist of two tasks. We then proceeded with the instructions for the real effort task, which participants read privately on their computer screens (An English translation of the instructions is included in Appendix B). Participants could ask clarifying questions throughout the experiment, which were answered in private. After finishing both tasks and the belief elicitation, they answered a short questionnaire that included questions about their age and gender. After finishing the questionnaire, participants received their payoffs in cash and left the laboratory.

5 Results

5.1 Deservingness and Lying Behavior

We test the hypotheses by focusing the analysis on the numbers reported in the die roll game. As participants could keep more money when they reported lower values, we would expect lying to lead to an over-reporting of low numbers and an under-reporting of high numbers. We see exactly this pattern in our data. Figure 2 shows the distribution of reported die rolls separately for those who earned 10 euros and for participants who earned 15 euros in DESERVE. Reports of both groups are significantly different from the underlying theoretical uniform distribution of the die rolls that would be reported under complete truth-telling (Chi-

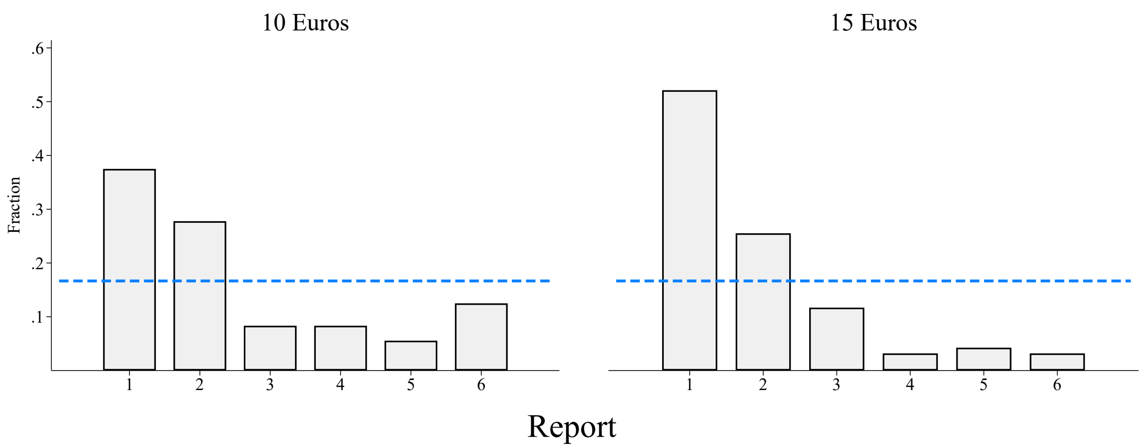
Table 2. Average die roll reports

	DESERVE		CONTROL			
	10 euros	15 euros	10 euros	15 euros	Bottom performers	Top performers
Report	2.542	1.915	1.890	2.073	2.039	1.931
	(1.744)	(1.292)	(1.217)	(1.505)	(1.322)	(1.413)
N	72	94	82	82	77	87

Note: Standard deviation in parenthesis.

squared test, $p < 0.001$ for both groups). Top performers report significantly lower numbers than bottom performers (Mann-Whitney test, $p = 0.020$),[13] leading to an average report of 1.92 for the former and 2.54 for the latter. This result speaks in favor of Hypothesis 1a; top performers lie more than bottom performers.

Figure 2. Histograms of die roll reports, DESERVE



Note: The left panel displays reported die rolls of participants who received 10 euros in DESERVE. The right panel displays reported die rolls of participants who received 15 euros in DESERVE. The dashed horizontal lines display the underlying theoretical distribution under truth-telling.

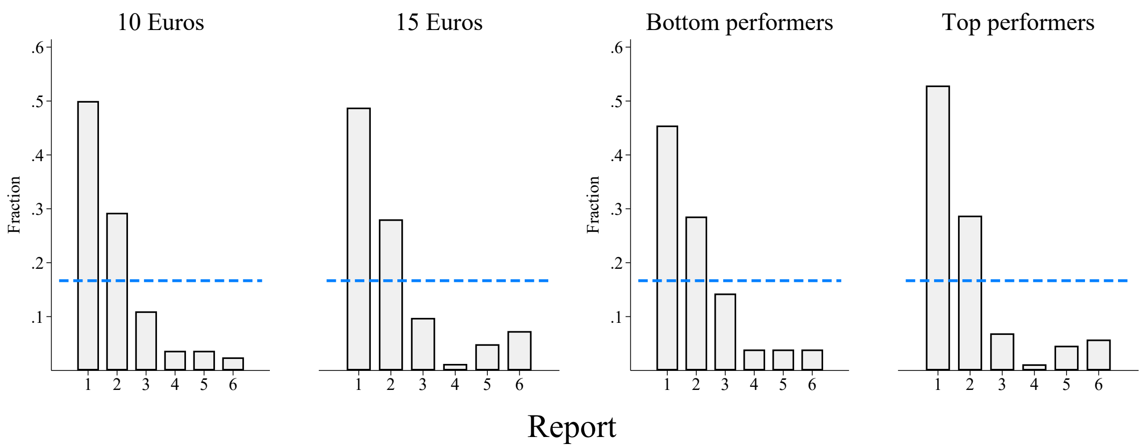
Result 1 (Related to Hypothesis 1a)**.** *In* DESERVE*, participants who receive 10 euros lie less than participants who receive 15 euros.*

The previous result alone does not provide any strong evidence of entitlement concerns affecting lying behavior. Other factors, such as an income effect or sorting of low and high-ability participants, could be alternative explanations of the observed differences. We draw on the reported die rolls in CONTROL to establish that an entitlement effect is causing the

[13] In the paper, all reported p-values come from two-sided tests.

differences. Participants also significantly lie in CONTROL (Chi-squared test, $p < 0.000$), but we do not observe significant differences in lying between participants who randomly received either 15 or 10 euros (Mann-Whitney test, $p = 0.700$). We thus find no evidence of an income effect affecting lying behavior.

Figure 3. Histograms of die roll reports, CONTROL



Note: The two left panels display reported die rolls of participants who either received 10 or 15 euros in CONTROL. The two right panels display reported die rolls of participants who were either bottom or top performers in CONTROL. The dashed horizontal lines display the underlying theoretical distribution under truth-telling.

Since we do not find any significant differences in reported numbers between an endowment of 10 euros and 15 euros in CONTROL, we pool the data of both groups and test whether reports differ by performance level. A Mann-Whitney test returns a value of $p = 0.314$, and thus we conclude there is no evidence of differences in lying behavior by performance group in CONTROL. As visible from Table 2, the mean reported die rolls are very similar between the different comparison groups in CONTROL, further supporting the notion that there are no systematic income or sorting effects that could explain the reporting difference observed in DESERVE.[14]

Taken together, the evidence above implies the following:

Result 2 (Related to Hypothesis 2a)**.** *There is no difference in lying between participants who receive 10 euros and participants who receive 15 euros in* CONTROL.

Result 3 (Related to Hypothesis 2b)**.** *There is no difference in lying between top performers and bottom performers in* CONTROL.

[14]We also find no differences when we further split up the observations in the control treatment by income and performance, even though our sample size becomes relatively small in that case. See Appendix A.2 for details.

Table 3. OLS regressions with Report as dependent variable

	(1)	(2)
DESERVE	0.594*	0.641**
	(0.281)	(0.269)
Top performer	−0.110	−0.106
	(0.225)	(0.201)
DESERVE×Top performer	−0.701*	−0.766**
	(0.361)	(0.345)
15 Euros	0.184	0.236
	(0.161)	(0.171)
Constant	1.948***	0.649
	(0.241)	(0.537)
Controls	No	Yes
Observations	330	330
R^2	0.031	0.059

Note: Top performer is a dummy equal to one if the participant was among the top half of performers in the real effort task. 15 euros is a dummy equal to one if the participant received 15 euros. Controls include age and gender. Standard errors were clustered at the session level.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 3 presents regressions of reported die rolls as the dependent variable and dummy variables, as independent variables, that allow us to get an estimate of the treatment effect. We see that the interaction between DESERVE and top performer is negative and significant, implying that their perception of deservingness affects lying even after lying is controlled for performance and endowment.

Result 4. *The difference between participants who receive 10 euros and participants who receive 15 euros is larger in* DESERVE *than in* CONTROL.

In Hypothesis 1a, we conjectured that lying about earned income can be driven by a feeling of deservingness: bottom-performing participants, on average, feel more guilty and less disappointed about their income and will thus lie less than their high-performing counterparts. If this mechanism is correct, then participants with lower performance beliefs within the same performance group should also lie less. We examine this relation in regressions of reported die rolls on performance beliefs that we report in Table 4.

In the table we see that the belief coefficient is only significant if interacted with the treatment dummy. When participants hold more positive beliefs about their performance,

Table 4. **OLS regressions with Report as dependent variable**

	(1)	(2)	(3)
Belief	0.020	0.017	0.015
	(0.032)	(0.036)	(0.035)
DESERVE	−0.514	−0.506	−0.481
	(0.353)	(0.339)	(0.319)
DESERVE×Belief	0.070**	0.070**	0.068**
	(0.032)	(0.031)	(0.028)
15 Euros	0.213	0.212	0.232
	(0.162)	(0.160)	(0.166)
Top performer	0.129	0.157	0.147
	(0.257)	(0.257)	(0.260)
Encrypted words		−0.007	−0.011
		(0.025)	(0.025)
Constant	1.600***	1.866	0.783
	(0.415)	(1.086)	(0.927)
Controls	No	No	Yes
Observations	330	330	330
R^2	0.048	0.049	0.074

Note: Top performer is a dummy equal to one if the participant was among the top half of performers in the real effort task. Controls include age and gender. Standard errors were clustered at the session level.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

they report lower numbers from the die roll game in DESERVE.[15] Note that the interaction coefficient of belief in Table 4 is significant after controlling for the performance group. This significance gives direct evidence of relative entitlement concerns: among the top and bottom performers, those who hold more positive beliefs lie more. Furthermore, the belief coefficients barely change when controlling for the words encrypted in the real effort task, suggesting that relative, not absolute, effort considerations are driving the results.

We summarize the evidence above in the following results.

Result 5 (Related to Hypothesis 1b)**.** *Participants' willingness to lie in* DESERVE *is influenced by the belief they hold about their performance in the real effort task. Participants who hold more positive beliefs about their relative performance lie more.*

Result 6 (Related to Hypothesis 2c)**.** *Beliefs about performance do not influence lying in the*

[15] Remember that belief and report are coded such that lower numbers correspond to more positive beliefs and more money kept.

control treatment.

The effect of performance beliefs on lying holds across the whole belief domain. In Figure 4, we split each of the top and bottom performing groups in the upper and lower half, based on their performance belief. We then arrive at four belief quartiles that rank participants by their relative beliefs. Quartile 1 contains participants who believe that they hold rank 1–5, quartile 2 contains ranks 6–12, quartile 3 contains ranks 13–16, and quartile 4 contains all participants with rank beliefs worse than 16.[16] Per quartile and treatment, the figure plots the average reported die roll. There is a clear downward trend in reported die rolls in DESERVE but not in CONTROL (Jonckheere–Terpstra test for descending order, $p = 0.020$ in DESERVE, $p = 0.187$ in CONTROL). However, the average reported die rolls in CONTROL are low throughout the belief distribution. Their level is reached only by participants in DESERVE who hold relatively high beliefs. These tendencies also manifest themselves in non-parametric tests.

Compared with participants who randomly get 10 euros, bottom performers in DESERVE report significantly lower values (Mann-Whitney test, $p = 0.027$). There is no significant difference between top performers in DESERVE and participants who randomly get 15 euros in CONTROL (Mann-Whitney test, $p = 0.621$). As seen in Table 3, the differences remain significant even after controlling for demographics and performance groups. The treatment dummy for DESERVE is significantly positive, suggesting that bottom performers lie less in DESERVE than in CONTROL. The sum of the treatment dummy and the interaction between treatment and top performer is not significantly different from zero (F-test, $p = 0.603$). That is, we draw the same conclusions from the regressions as we drew from the non-parametric tests.

Result 7 (Related to Hypotheses 3a and 3b)**.** *Reports of participants with 15 euro envelopes do not differ significantly across treatments*

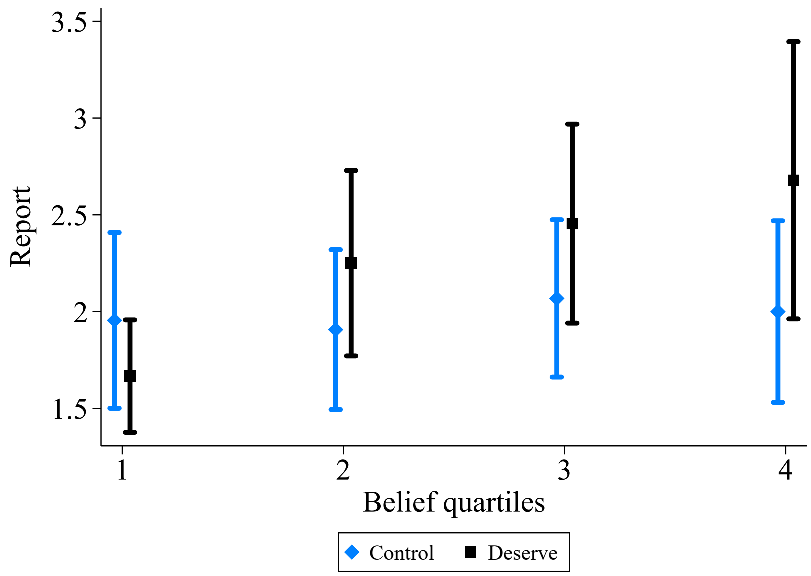
Result 8 (Related to Hypotheses 3a and 3b)**.** *Participants with 10 euro envelopes in* DESERVE *lie significantly less than participants with 10 euro envelopes in* CONTROL*.*

5.2 Additional Results

In this subsection, we present results that help to distinguish between different alternative interpretations of our findings. A competing explanation for the result that entitlement influences behavior in DESERVE but not in CONTROL could be that, because participants were provided with different effort incentives in both treatments, differences in absolute effort levels

[16]These are the quartile borders for sessions with 24 participants. For the sessions with 22 participants, the borders of quartiles 1 and 2 slightly change, as participants with belief 6 are in the first quartile. The results do not differ qualitatively if we drop observations from 22 participant sessions.

Figure 4. Average die roll reports by belief quartile



Note: Error bars display 95% confidence intervals.

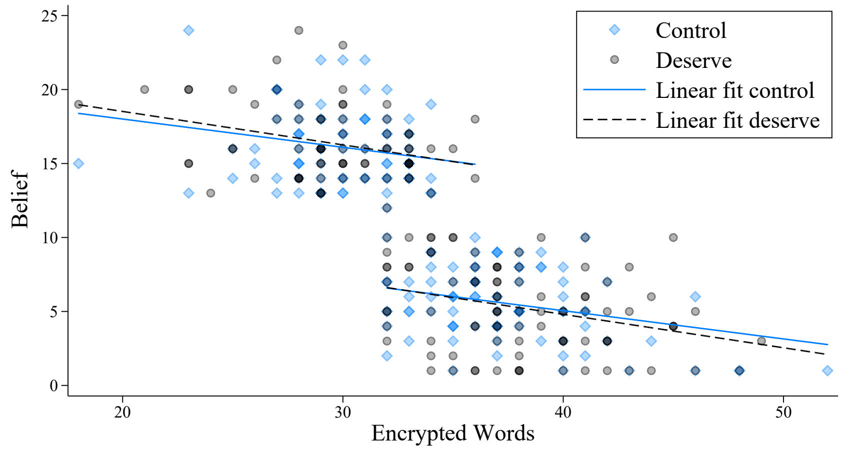
can explain the observed treatment effects. This is, however, not the case. Performance in the encryption task was very similar in both treatments despite the different incentives that were provided. The average number of encrypted words was 34.3 in DESERVE and 33.8 in CONTROL, and the minimum number of encrypted words was 18 in both treatments. In addition, the distributions were not significantly different.[17]

As a second concern, we address the potential endogeneity of beliefs. The evidence could be interpreted as showing that participants distort their beliefs in DESERVE to justify their lie in the die roll task. If this were the case, we would expect beliefs to be different between both treatments. We do not, however, observe this in the data. A test on the equality of beliefs in both treatments cannot be rejected (Mann-Whitney test, $p = 0.503$). In fact, beliefs are strongly associated with performance in the real effort task in both treatments. Figure 5 shows a scatter plot of belief and effort provision. In both treatments, beliefs become more positive the higher individual effort was exerted. This is intuitive given that participants only knew their privately provided effort but not the effort of others when they stated their beliefs.

The straight lines in Figure 5 are the coefficient estimates of a regression of effort on beliefs. For an explanation that participants distorted beliefs after the lying task, we would expect a flatter line in DESERVE than in CONTROL, as the association between effort provision

[17]The finding that financial incentives do not influence effort provision is in line with experimental findings from Erkal et al. (2018) who find that monetary incentives do not affect performance in real effort tournaments unless subjects are provided with an outside option (such as an option to leave the experiment early or a paid pause).

Figure 5. Scatter plot of belief and encrypted words



Note: Lines are linear fits of OLS regressions of belief on encrypted words, at means of age and gender.

and beliefs would become weaker. The slopes are not significantly different across treatments and, if anything, are even steeper in DESERVE. Furthermore, the coefficients of regressions of beliefs on encrypted words and further controls are not jointly significantly different between treatments (Chi-squared test, $p = 0.315$), which gives further support to the claim that beliefs are not formed systematically different between treatments.[18]

6 Conclusion

Does the way one earns income affect lying? Smith (2010) points out that, at least since Cherry et al. (2002), it cannot be assumed that the source of the endowment does not matter in experiments. He argues that researchers should systematically study the effect of earned income in experiments on a case-by-case basis. Our study identifies that deservingness influences lying in an intuitive direction: when participants' performance determines income, participants who earn less money lie less than participants who earn more money. This result is driven by the guilt of low performers, who lie even less than participants who randomly earn the same endowment. In other words, in our experiment, the group with the lowest levels of lying has the lowest levels of deservingness.

Deservingness matters because of relative entitlement concerns. We find evidence that, for a given income, participants with more positive beliefs lie more. Interestingly, we can establish that the underlying treatment effect does not depend on the performance in the real effort task per se but on the fact that the income is earned through effort. This speaks

[18]See Appendix A.1 for the regression outputs.

for the interpretation of our results that the endowment origin, and not the prestige derived by belonging to the top performance group, is the driving channel of our results. We do not find differences in lying when participants absolve the same task but lie to keep windfall endowments. Since effort provision does not systematically differ across treatments, it is unlikely that other factors contributed to this effect, such as participants generally lying more when they previously put in more effort.

A more surprising result is that earned income does not increase lying relative to the windfall income benchmark. When comparing reporting across both treatments, the significant treatment effect we find is a decrease in lying for low-performing participants in DESERVE relative to the windfall endowment baseline. Lying of top performers is not significantly higher relative to the control group. This result points to the importance of guilty feelings when studying entitlement concerns. Our results imply that deservingness does not work like a self-serving justification but instead works like a social norm, where some individuals feel less deserving of behaving unethically because other people feel more deserving. Further exploration of why justifications are being used mainly self-servingly in some settings, whereas social norms can lead to "backfiring" effects in settings like the one studied here, seems like a promising area for future research.

Another natural progression of this work would be to analyze how results change under different real effort incentive structures. It would be interesting to see whether similar mechanisms as the one proposed by us can be translated into further games. Our framework can possibly explain the positive correlations found by other researchers between real effort and lying when subjects are paid piece rates (Gill et al. 2013, Grundmann and Lambsdorff 2017, Duch et al. 2018), but it has been unclear so far whether these correlations are observed because of income effects, sorting, or because of entitlement. Our results speak for the third channel, and income effects and sorting do not seem to be driving the results of our experiment.

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A Appendix

A.1 Additional tables

Table 5. OLS regressions with belief as dependent variable

	DESERVE	CONTROL
Encrypted words	-0.226^{***}	-0.191^{***}
	(0.047)	(0.058)
Female	1.188^{***}	0.939^{**}
	(0.398)	(0.394)
Age	0.075^{*}	-0.047
	(0.044)	(0.044)
Top performer	-9.275^{***}	-9.259^{***}
	(0.573)	(0.548)
Constant	20.864^{***}	22.585^{***}
	(1.895)	(2.017)
Observations	166	164

Note: top performer dummy is equal to one if the participant was under the top performers. Encrypted words denotes the number of words encrypted in the real effort task. Robust standard errors in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

A.2 Further results for CONTROL

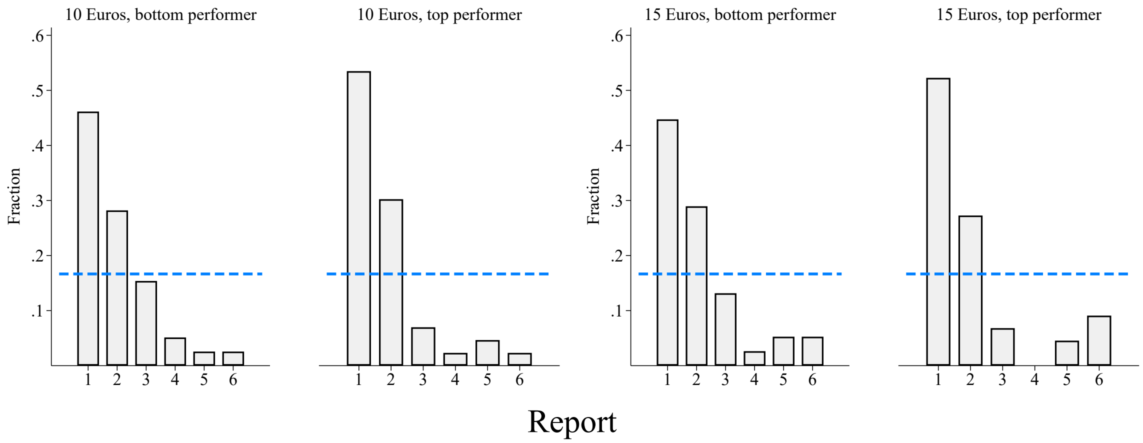
In this section we present the histograms and average die roll reports for CONTROL when split up by income and by performance group. In pairwise comparisons, they are not significantly different from one another (Mann-Whitney test, p > 0.320).

Table 6. Average die rolls, CONTROL

	10 euros		15 euros	
	Bottom performer	Top performer	Bottom performer	Top performer
Report	1.974	1.814	2.105	2.045
	(1.224)	(1.220)	(1.429)	(1.584)
N	39	43	38	44

Note: Standard deviations in parenthesis.

Figure 6. Histograms of die roll reports split by performance and endowment, CONTROL



Note: The dashed horizontal lines display the underlying theoretical distribution under truth-telling.

A.3 Proofs

Throughout this section we will sometimes use $m = \pi_\ell - \pi_\hbar$ to save notation. We will also denote the support of $H(\rho \,|\, \omega_j)$ by $B(\omega_j)$ for $j \in \{\beta, \tau\}$.

A.3.1 Proof of observation 1

Consider the choice of an individual who drew $\hbar$. By lying and reporting ℓ, such an individual will incur a lying cost $c_i \geq 0$, and lose a material payoff of size m. Additionally, the entitlement payoff changes from $D(\omega_i - \pi_\hbar - r_i)$ under truth-telling to $D(\omega_i - \pi_\ell - r_i)$ under lying. The direction and magnitude of this latter effect depends on the sign of $\omega_i - \pi_\hbar - r_i$ and $\omega_i - \pi_\ell - r_i$.

We need to consider three different cases:

Case (i): $\omega_i - \pi_\ell - r_i < \omega_i - \pi_\hbar - r_i < 0$; the individual incurs a loss from lying and from truth-telling. Note that the loss is always higher when lying, as $\pi_\ell > \pi_\hbar$. In this case the utility from truth-telling is $\omega_i - \pi_\hbar - \lambda|\omega_i - \pi_\hbar - r_i|$ and from lying $\omega_i - \pi_\ell - c_i - \lambda|\omega_i - \pi_\ell - r_i|$. They will report $\hbar$ if

$$\begin{aligned}&\omega_i - \pi_\hbar - \lambda|\omega_i - \pi_\hbar - r_i| > \omega_i - \pi_\ell - c_i - \lambda|\omega_i - \pi_\ell - r_i|\\ &\qquad \Rightarrow m + c_i > \lambda|\omega_i - \pi_\hbar - r_i| - \lambda|\omega_i - \pi_\ell - r_i| = \lambda(\omega_i - \pi_\ell - r_i) - \lambda(\omega_i - \pi_\hbar - r_i) = -\lambda m.\end{aligned}$$

The left-hand side is positive for any $c_i \geq 0$ while the right-hand side is negative.

Case (ii): $\omega_i - \pi_\ell - r_i < 0 \leq \omega_i - \pi_\hbar - r_i$. The individual incurs a loss from lying and a gain from truth-telling. The utility from lying is $\omega_i - \pi_\ell - c_i - \lambda|\omega_i - \pi_\ell - r_i|$ and from truth-telling $\omega_i - \pi_\hbar - \gamma|\omega_i - \pi_\hbar - r_i|$. They will report $\hbar$ if

$$\begin{aligned}&\omega_i - \pi_\hbar - \gamma|\omega_i - \pi_\hbar - r_i| > \omega_i - \pi_\ell - c_i - \lambda|\omega_i - \pi_\ell - r_i|\\ &\qquad \Rightarrow m + c_i > \gamma|\omega_i - \pi_\hbar - r_i| - \lambda|\omega_i - \pi_\ell - r_i| = \lambda(\omega_i - \pi_\ell - r_i) + \gamma(\omega_i - \pi_\hbar - r_i).\end{aligned}$$

As before, the left-hand side is positive for any $c_i \geq 0$. Rewrite the right-hand side as

$$\begin{aligned}\lambda(\omega_i - \pi_\ell - r_i) + \gamma(\omega_i - \pi_\hbar - r_i) &= (\lambda+\gamma)(\omega_i - r_i) - \lambda\pi_\ell - \gamma\pi_\hbar \\ &< (\lambda+\gamma)\pi_\ell - \lambda\pi_\ell - \gamma\pi_\hbar = \gamma m,\end{aligned}$$

where the inequality follows from the fact that $\omega_i - r_i < \pi_\ell$ in the case that we currently examine. A sufficient condition for the left-hand side to be larger than the right-hand side is that $m > \gamma m$, which holds as we assumed that $\gamma \leq \lambda < 1$.

Case (iii): $0 \leq \omega_i - \pi_\ell - r_i < \omega_i - \pi_\hbar - r_i$. The individual experiences a gain from both, lying and truth-telling. The utility from lying is $\omega_i - \pi_\ell - c_i - \gamma|\omega_i - \pi_\ell - r_i|$ and from truth-telling $\omega_i - \pi_\hbar - \gamma|\omega_i - \pi_\hbar - r_i|$. They will report $\hbar$ if

$$\begin{aligned}&\omega_i - \pi_\hbar - \gamma|\omega_i - \pi_\hbar - r_i| > \omega_i - \pi_\ell - c_i - \gamma|\omega_i - \pi_\ell - r_i| \\ &\quad\Rightarrow m + c_i > \gamma|\omega_i - \pi_\hbar - r_i| - \gamma|\omega_i - \pi_\ell - r_i| = \gamma(\omega_i - \pi_\hbar - r_i) - \gamma(\omega_i - \pi_\ell - r_i) = \gamma m.\end{aligned}$$

As in the preceding cases, $c_i \geq 0$ and $\gamma < 1$ ensure that the statement is true under both elation and guilt.

The utility of truth-telling is always higher for than the utility of lying for individuals in state $\hbar$. Thus, in any equilibrium, no individual drawing state $\hbar$ reports ℓ.

A.3.2 Proof of observation 2

From definition 1 we know that

$$r(\rho^1(\omega_\beta), w^e) - r(0, w^e) = \omega_\beta - \pi_\ell \text{ and } r(\rho^1(\omega_\tau), w^e) - r(\frac{1}{2}, w^e) = \omega_\tau - \pi_\hbar - w^e.$$

The parameter assumptions ensure that $\omega_\beta - \pi_\ell > \omega_\tau - \pi_\ell - w^e$.[19]

Further, convexity of r with respect to ρ implies

$$r(\rho^1(\omega_\beta), w^e) - r(0, w^e) \leq r(\rho^1(\omega_\beta) + \frac{1}{2}, w^e) - r(\frac{1}{2}, w^e).$$

This gives $\omega_\beta - \pi_\ell$ as a lower bound of the right-hand side and implies that

$$r(\rho^1(\omega_\tau), w^e) - r(\frac{1}{2}, w^e) < r(\rho^1(\omega_\beta) + \frac{1}{2}, w^e) - r(\frac{1}{2}, w^e).$$

[19] $w^e(\sigma) = \frac{\omega_\tau + \omega_\beta}{2} - \frac{1+\sigma}{2}\pi_\hbar - \frac{1-\sigma}{2}\pi_\ell$, where σ is the share of liars among individuals who drew ℓ. This terms takes on a minimum at $\sigma = 0$. It is sufficient to show that

$$\begin{aligned}\omega_\beta - \pi_\ell &> \omega_\tau - \pi_\ell - w^e(0) = \omega_\tau - \pi_\ell - \Big(\frac{\omega_\tau + \omega_\beta}{2} - \frac{\pi_\hbar + \pi_\ell}{2}\Big) \\ \Rightarrow \frac{\omega_\tau + \omega_\beta}{2} - \frac{\pi_\hbar + \pi_\ell}{2} &> \omega_\tau - \omega_\beta \\ \Rightarrow 3\omega_\beta - \omega_\tau &> \pi_\hbar + \pi_\ell.\end{aligned}$$

The statement is true, as the right-hand side is strictly smaller than ω_β and the left-hand side is strictly larger than ω_β.

As r is increasing in ρ, it follows that $\rho^1(\omega_\tau) < \rho^1(\omega_\beta) + \frac{1}{2}$.

To show the second statement, first note that

$$r(\rho^2(\omega_j), w^e) - r(\rho^1(\omega_j), w^e) = \pi_\ell - \pi_\hbar. \text{ for } j \in \{b, t\}.$$

Now shift ρ by adding $\Delta = \rho^1(\omega_\tau) - \rho^1(\omega_\beta)$ and use convexity to derive the lower bound

$$r(\rho^2(\omega_\beta), w^e) - r(\rho^1(\omega_\beta), w^e) \leq r(\rho^2(\omega_\beta) + \Delta, w^e) - r(\rho^1(\omega_\tau), w^e),$$

so that

$$r(\rho^2(\omega_\tau), w^e) - r(\rho^1(\omega_\tau), w^e) \leq r(\rho^2(\omega_\beta) + \Delta, w^e) - r(\rho^1(\omega_\tau), w^e).$$

As r is increasing in ρ, this implies that $\rho^2(\omega_\tau) \leq \rho^2(\omega_\beta) + \Delta < \rho^2(\omega_\beta) + \frac{1}{2}$.

A.3.3 Proof of observation 3

An individual with income ω_i receives utility

$$\omega_i - \pi_\ell - D(\omega_i - \pi_l - r(\rho, w^e))$$

from truth-telling and

$$\omega_i - \pi_\hbar - D(\omega_i - \pi_h - r(\rho, w^e)) - c_i$$

from lying. The individual utility from lying is strictly decreasing in the lying cost and therefore lying behavior must be of a threshold type. We consider three cases.

Case (i): $\rho_i \leq \rho^1(\omega_i)$. The individual experiences gains from lying and from truth-telling. They lie if

$$\begin{aligned} \omega_i - \pi_\hbar - \gamma|\omega_i - \pi_h - r(\rho_i, w^e)| - c_i &\geq \omega_i - \pi_\ell - \gamma|\omega_i - \pi_l - r(\rho_i, w^e)| \\ \Rightarrow \pi_\ell - \pi_\hbar - \gamma(\pi_\ell - \pi_\hbar) &\geq c_i. \end{aligned}$$

Case (ii): $\rho_i \in (\rho^1(\omega_i), \rho^2(\omega_i))$. The individual experiences gains from lying and losses from truth-telling. They lie if

$$\begin{aligned} \omega_i - \pi_\hbar - \gamma|\omega_i - \pi_h - r(\rho_i, w^e)| - c_i &\geq \omega_i - \pi_\ell - \lambda|\omega_i - \pi_l - r(\rho_i, w^e)| \\ \Rightarrow \pi_\ell - \pi_\hbar - \gamma(\omega_i - \pi_\hbar - r(\rho_i, w^e)) - c_i &\geq \lambda(\omega_i - \pi_\ell - r(\rho_i, w^e)) \\ \Rightarrow \pi_\ell - \pi_\hbar - (\gamma + \lambda)(\omega_i - r(\rho_i, w^e)) + \gamma\pi_\hbar + \lambda\pi_\ell &\geq c_i. \end{aligned}$$

Case (iii): $\rho_i \geq \rho^2(\omega_i)$. The individual experiences losses from both, lying and truth-telling. They lie if

$$\begin{aligned} \omega_i - \pi_\hbar - \lambda|\omega_i - \pi_h - r(\rho_i, w^e)| - c_i &\geq \omega_i - \pi_\ell - \lambda|\omega_i - \pi_l - r(\rho_i, w^e)| \\ \Rightarrow \omega_i - \pi_\hbar + \lambda(\omega_i - \pi_h - r(\rho_i, w^e)) - c_i &\geq \omega_i - \pi_\ell + \lambda(\omega_i - \pi_l - r(\rho_i, w^e)) \\ \Rightarrow \pi_\ell - \pi_\hbar + \lambda(\pi_\ell - \pi_\hbar) &\geq c_i. \end{aligned}$$

We can define for each case a threshold lying cost $\hat{c}$ for which the above equations hold with equality. Combining all cases gives the threshold lying function

$$\hat{c}(\pi_l, \pi_h, \rho_i^e, w^e, \omega_i, \lambda, \gamma) = \begin{cases} \pi_\ell - \pi_h - \gamma(\pi_\ell - \pi_h) & \text{if } \rho_i \leq \rho^1(\omega_i) \\ \pi_\ell - \pi_{\hbar} + \gamma(\pi_{\hbar} - (\omega_j - r(\rho, w^e))) + \lambda(\pi_\ell - (\omega_j - r(\rho, w^e))) & \text{if } \rho_i \in (\rho^1(\omega_i), \rho^2(\omega_i)) \\ \pi_\ell - \pi_{\hbar} + \lambda(\pi_\ell - \pi_{\hbar}) & \text{if } \rho_i \geq \rho^2(\omega_i). \end{cases}$$

An individual with $c_i \leq \hat{c}$ lies while they tell the truth otherwise.

A.4 Proof of hypothesis 1a.

The share of individuals with endowment ω_j who lie is

$$s_j(m, w^e, \lambda, \gamma) = \int_{\rho \in B(\omega_j)} F(\hat{c}(m, \rho, w^e, \omega_j, \lambda, \gamma)) \, \mathrm{d}H(\rho \,|\, \omega_j). \tag{3}$$

Consider $s_\beta(m, w^e, \lambda, \gamma)$, and recall that $F(c)$ is an increasing function and that $\hat{c}(m, \rho, w^e, \omega_\beta, \lambda, \gamma)$ is increasing in ρ. Using $H(\rho \,|\, \omega_\tau) \leq H(\rho - \frac{1}{2}|\omega_\beta)$ it then follows that

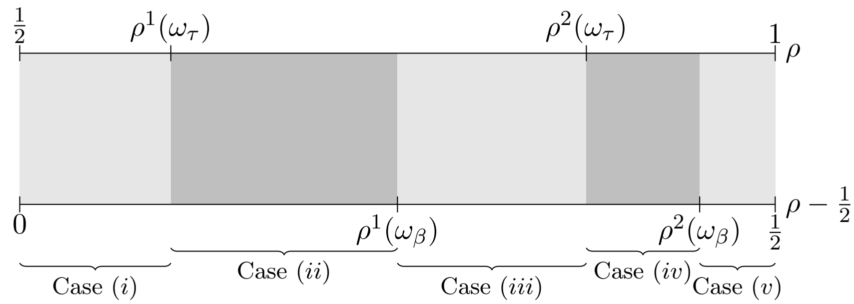
$$\begin{aligned} s_\beta(m, w^e, \lambda, \gamma) &= \int_0^{\frac{1}{2}} F(\hat{c}(m, \rho, w^e, \omega_\beta, \lambda, \gamma)) \, \mathrm{d}H(\rho \,|\, \omega_\beta) \\ &= \int_{\frac{1}{2}}^1 F(\hat{c}(m, \rho - \frac{1}{2}, w^e, \omega_\beta, \lambda, \gamma)) \, \mathrm{d}H(\rho - \frac{1}{2}|\omega_\beta) \\ &\leq \int_{\frac{1}{2}}^1 F(\hat{c}(m, \rho - \frac{1}{2}, w^e, \omega_\beta, \lambda, \gamma)) \, \mathrm{d}H(\rho \,|\, \omega_\tau). \end{aligned}$$

For $s_\tau(m, w^e, \lambda, \gamma) > s_\beta(m, w^e, \lambda, \gamma)$ it is hence sufficient to show that

$$\int_{\frac{1}{2}}^1 F(\hat{c}(m, \rho, w^e, \omega_\tau, \lambda, \gamma)) \, \mathrm{d}H(\rho \,|\, \omega_\tau) > \int_{\frac{1}{2}}^1 F(\hat{c}(m, \rho - \frac{1}{2}, w^e, \omega_\beta, \lambda, \gamma)) \, \mathrm{d}H(\rho \,|\, \omega_\tau).$$

Since $F'(c) > 0$ and has full support, a sufficient condition is that $\hat{c}(m, \rho, w^e, \omega_\tau, \lambda, \gamma) \geq \hat{c}(m, \rho - \frac{1}{2}, w^e, \omega_\beta, \lambda, \gamma)$ for all $\rho \in [\frac{1}{2}, 1]$, with strict inequality at some $\rho \in [\frac{1}{2}, 1]$. That is, we have to show that the lying cost threshold is smaller for bottom than for top performers for any two individuals in the two groups who hold the same relative rank beliefs. Observation 2 implies that we need to consider five cases, which are displayed graphically in the figure below. For example, from observation 2 we know that there is a range of relative rank beliefs for which top performers experience losses from lying and gains from telling the truth, while bottom performers feel gains from both lying and truth-telling (case (ii) in the figure).

Figure 7. Relative rank beliefs – Cases



We will show now that on any of the five piecewise regions, the threshold lying cost of top performers is weakly higher.

Case (i). $\rho \leq \rho^1(\omega_\tau), \rho - \frac{1}{2} < \rho^1(\omega_\beta)$: The threshold cost for top and for bottom performers is $m - \gamma m$. Therefore,

$$\hat{c}(m, \rho, w^e, \omega_\tau, \lambda, \gamma) - \hat{c}(m, \rho - \frac{1}{2}, w^e, \omega_\beta, \lambda, \gamma) = -\gamma m + \gamma m = 0.$$

Case (ii). $\rho > \rho^1(\omega_\tau), \rho - \frac{1}{2} < \rho^1(\omega_\beta)$: The threshold cost for top performers is $m + \lambda\pi_\ell + \gamma\pi_\hbar - (\gamma + \lambda)[\omega_\tau - r(\rho, w^e)]$, and for bottom performers $m - \gamma m$. Therefore the difference becomes

$$\begin{aligned}\hat{c}(m, \rho, w^e, \omega_\tau, \lambda, \gamma) - \hat{c}(m, \rho - \frac{1}{2}, w^e, \omega_\beta, \lambda, \gamma) &= \lambda\pi_\ell + \gamma\pi_\ell - (\gamma + \lambda)(\omega_\tau - r(\rho, w^e)) \\ &= \lambda(\pi_\ell - (\omega_\tau - r(\rho, w^e)) + \gamma(\pi_\ell - (\omega_\tau - r(\rho, w^e)).\end{aligned}$$

The difference is positive if $\pi_\ell > \omega_\tau - r(\rho, w^e)$. r is increasing in ρ, and $\rho > \rho^1(\omega_\tau)$. We further know that $r(\rho^1(\omega_\tau), w^e) = \omega_\tau - \pi_\ell$. From these properties taken together it follows that $r(\rho, w^e) > \omega_\tau - \pi_\ell$ and therefore $\pi_\ell > \omega_\tau - r(\rho, w^e)$. We conclude that the difference is positive.

Case (iii) $\rho \leq \rho^2(\omega_\tau), \rho - \frac{1}{2} > \rho^1(\omega_\beta)$: The threshold cost for top performers is $m + \lambda\pi_\ell + \gamma\pi_\hbar - (\gamma+\lambda)(\omega_\tau - r(\rho, w^e))$, and for bottom performers $m + \lambda\pi_\ell + \gamma\pi_\hbar - (\gamma+\lambda)(\omega_\beta - r(\rho - \frac{1}{2}, w^e))$. Taking the difference,

$$\hat{c}(m, \rho, w^e, \omega_\tau, \lambda, \gamma) - \hat{c}(m, \rho - \frac{1}{2}, w^e, \omega_\beta, \lambda, \gamma) = (\lambda + \gamma)\left[\omega_\beta - r(\rho - \frac{1}{2}, w^e) - (\omega_\tau - r(\rho, w^e))\right].$$

The difference is positive if the term in square brackets is positive, or equivalently, if

$$r(\rho, w^e) - r(\rho - \frac{1}{2}, w^e) > \omega_\tau - \omega_\beta.$$

Because r is convex in ρ, the difference on the left-hand side is nondecreasing in ρ. Furthermore, as $\rho - \frac{1}{2} > \rho^1(\omega_\beta)$,

$$\begin{aligned} r(\rho, w^e) - r(\rho - \frac{1}{2}, w^e) &\geq r(\rho^1(\omega_\beta) + \frac{1}{2}, w^e) - r(\rho^1(\omega_\beta), w^e) \\ &> r(\rho^1(\omega_\tau), w^e) - r(\rho^1(\omega_\beta), w^e) \\ &= \omega_\tau - \omega_\beta, \end{aligned}$$

where the second inequality follows from observation 2, namely that $\rho^1(\omega_\beta) + \frac{1}{2} > \rho^1(\omega_\tau)$. The equality directly follows from definition 1. Therefore the difference is positive.

Case (iv) $\rho > \rho^2(\omega_\tau), \rho - \frac{1}{2} \leq \rho^2(\omega_\beta)$: The threshold cost for top performers is $m + \lambda m$, and for bottom performers $m + \lambda \pi_\ell + \gamma \pi_\hbar - (\gamma + \lambda)(\omega_\beta - r(\rho - \frac{1}{2}, w^e))$. The difference is

$$\hat{c}(m, \rho, w^e, \omega_\tau, \lambda, \gamma) - \hat{c}(m, \rho - \frac{1}{2}, w^e, \omega_\beta, \lambda, \gamma) = (\lambda + \gamma) \left[\omega_\beta - \pi_\hbar - r(\rho - \frac{1}{2}, w^e) \right].$$

It remains to be shown that the term in square brackets is positive. Since r is increasing in ρ, the reference point is smaller than $r(\rho - \frac{1}{2}, w^e) = r(\rho^2(\omega_\beta), w^e) = \omega_\beta - \pi_\hbar$. It follows that the term in square brackets is always positive.

Case (v) $\rho - \frac{1}{2} > \rho^2(\omega_\beta)$: The threshold cost for top and for bottom performers is $+\lambda m$, so that the difference in threshold cost is zero.

We conclude that threshold lying cost is always weakly larger for bottom performers and strictly larger for some in an interior equilibrium where belief threshold points are between zero and one.

A.4.1 Proof of hypothesis 1b.

Taking the derivative of the threshold lying function with respect to the performance belief:

$$\frac{\partial \hat{c}}{\partial \rho_i} = \begin{cases} 0 & \text{if } \rho_i \leq \rho^1(\omega_i) \\ (\lambda + \gamma) \frac{\partial r(\rho_i, w^e)}{\partial \rho_i} & \text{if } \rho_i \in (\rho^1(\omega_i), \rho^2(\omega_i)) \\ 0 & \text{if } \rho_i \geq \rho^2(\omega_i). \end{cases} \tag{4}$$

The threshold lying cost is weakly increasing in the performance belief on each piecewise region. Since further, $\lim_{\rho_i \to \rho^1(\omega_i)^+} \hat{c}(m, \rho_i, w^e, \omega_i, \lambda, \gamma) = \hat{c}(m, \rho^1(\omega_i), w^e, \omega_i, \lambda, \gamma)$ and $\lim_{\rho_i \to \rho^2(\omega_i)^-} \hat{c}(m, \rho_i, w^e, \omega_i, \lambda, \gamma) = \hat{c}(m, \rho^2(\omega_i), w^e, \omega_i, \lambda, \gamma)$, it is also weakly increasing on the whole domain.

A.5 Proof of hypotheses 3a and 3b

In CONTROL, a fraction $F(m)$ lies. We derive the conditions under which the fraction of liars with income ω_j is higher in DESERVE compared to CONTROL.

For a given income, more people lie in DESERVE if showing that

$$\int_{s\in B(\omega_j)} [F(\hat{c}(r(\rho, w^e), \omega_j)) - F(m)] \, \mathrm{d}H(s|\omega_\tau) > 0.$$

Since $F'(c) > 0$ and has full support, a sufficient condition is that

$$\hat{c}(r(\rho, w^e), \omega_j) - m > 0 \text{ for all } \rho \in B(\omega_j).$$

Plugging in the definition of $\hat{c}(r_i, \omega_j)$, the condition becomes

$$\hat{c}(r(\rho, w^e), \omega_j) - m = \begin{cases} -\gamma m & \text{if } \rho \leq \rho^1(\omega_j) \\ \gamma(\pi_{\hbar} - (\omega_j - r(\rho, w^e))) + \lambda(\pi_\ell - (\omega_j - r(\rho, w^e))) & \text{if } \rho \in (\rho^1(\omega_j), \rho^2(\omega_j)) \\ \lambda m & \text{if } \rho \geq \rho^2(\omega_j). \end{cases}$$

As $\gamma \to 0$ this condition will be fulfilled, but in the more general case, the comparison is ambiguous as individuals that experience guilt will tend to lie less than individuals who are not entitled, while individuals who experience disappointment will tend to lie more.

The treatment comparison thus depends on the relative importance of guilt. Taking the derivative of the share of liars with a given income (equation 3) with respect to γ:

$$\begin{aligned} \frac{\partial s_j}{\partial \gamma} &= \int_{s\in B(\omega_j)} F'(\hat{c}) \frac{\partial \hat{c}}{\partial \gamma} \, \mathrm{d}H(s|\omega_\tau) \\ &= -\int_{\min\{B(\omega_j)\}}^{\rho^1(\omega_j)} F'(\hat{c}) m \, \mathrm{d}H(s|\omega_\tau) + \int_{\rho^1(\omega_j)}^{\rho^2(\omega_j)} F'(\hat{c})(\pi_{\hbar} - (\omega_j - r(\rho, w^e))) \, \mathrm{d}H(s|\omega_\tau) \\ &< 0. \end{aligned}$$

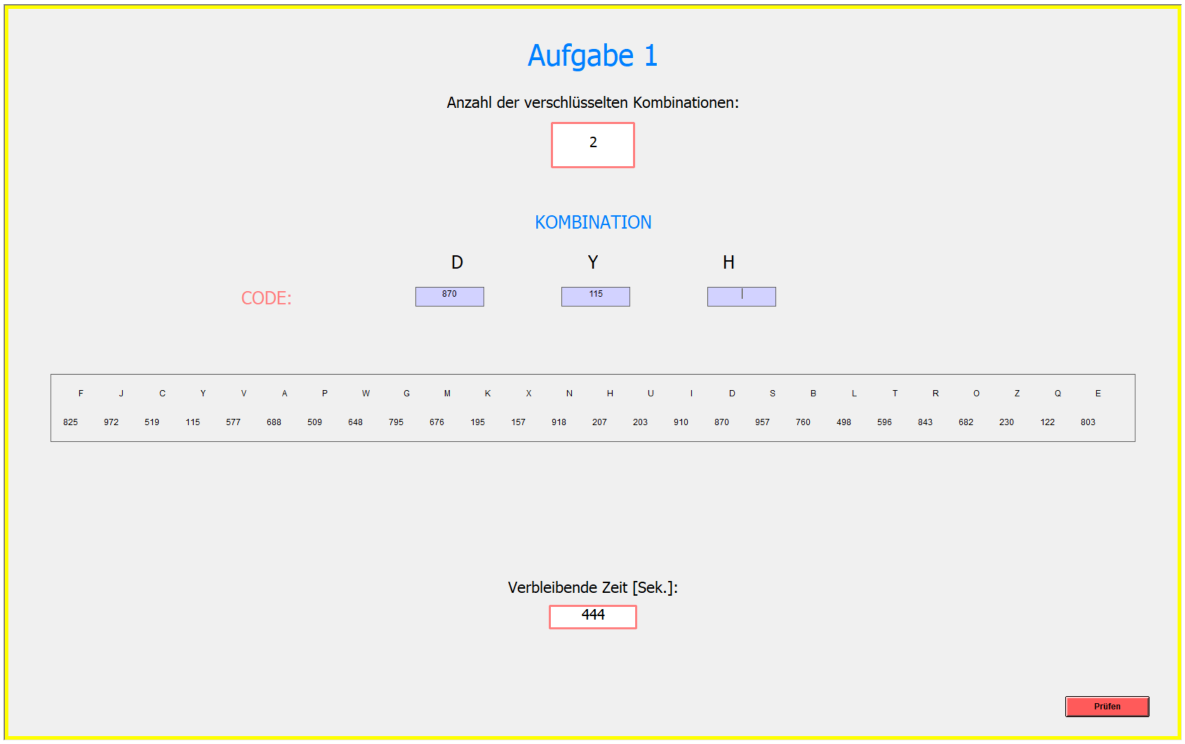
The share of liars decreases if guilt motives become more prevalent. Thus, since $s_j(\gamma = 0) > F(m)$, we can apply the intermediate value theorem to conclude that, if $s_j(\gamma = 1) < F(m)$, there will be a critical value $\tilde{\gamma}_j > 0$ with $s_j(\tilde{\gamma}_j) = F(m)$. Individuals will lie less in DESERVE than in CONTROL if $\gamma > \tilde{\gamma}_j$.

The proof of hypothesis 1a further implies that $s_\tau(\tilde{\gamma}_\tau) > s_\beta(\tilde{\gamma}_\tau)$, and hence $\tilde{\gamma}_\tau > \tilde{\gamma}_\beta$. This means that if guilt motives are strong ($\gamma > \tilde{\gamma}_\beta$) but not too strong ($\gamma < \tilde{\gamma}_\tau$), top performers will lie more and bottom performers less than in BASELINE.

B Experimental Instructions

In their cubicles, participants sit in front of a computer. Additionally they have a die and a printed screen shot of the encryption task on their desk.

Figure 8. Handout to participants



B.0.1 Instructions DESERVE

[Screen 1]

Welcome to our experiment!

During the experiment you are not allowed to use electronic devices or to communicate with other participants. Please use only the programs and functions intended for the experiment. Please do not talk to the other participants. If you have a question, please raise your hand. We will then come to you and answer your question in silence. Please do not ask your questions out loud. If the question is relevant for all participants, we will repeat it loudly and answer it. If you violate these rules, we must exclude you from the experiment and the payout.

This experiment consists of two tasks. You will now immediately proceed with the first task. After you have finished the first task, you will receive the instructions for the second part.

During the experiment you will earn money. Additionally, you will get a show-up fee of 5 euros. Your total payoff for the experiment will thus consist of

5 euros show-up fee + money depending on the decisions in task 1 and task 2

All the decisions during the experiment are anonymous, and other participants will not find out about your choices.

Press OK when you are ready to start the experiment.

[Screen 2]

Task 1

The task consists of encoding combinations of letters into numbers. In the task, three capital letters always yield a "combination"; You will be given a table that for each letter contains an encryption code. You will have to encrypt each letter with its code. Your task will be to encode as many combinations as possible.

On your table you can find a sheet of paper with an example screenshot from task one.

In that example, three capital letters: "D", "Y" and "H" have to be encoded. The participant has already encrypted 2 combinations correctly. The solution follows immediately from the table:

The encryption code for "D" is 870 (already entered by the participant)
The encryption code for "Y" is 115 (already entered by the participant)
The encryption code for "H" is 207 (not entered yet by the participant)

To make an input, you have to click on the blue box below the first capital letter. To move between boxes you can use the Tab key or your mouse.

Press OK to continue.

[Screen 3]

Example

You can see in the example that there is a "Check" button in the lower right corner of the screen.

If all 3 numbers have been entered, proceed by clicking the "Check" button. The computer then checks whether all capital letters have been encoded correctly. Only then the combination is counted as successfully solved. After that a new combination (again consisting of three capital letters) is randomly drawn.

Furthermore, a new encryption table is generated in two steps: 1. The computer program randomly selects in the table a new set of three-digit numbers to be used for the encoding of the capital letters. 2. Additionally, the computer program shuffles the position of the capital letters in the table. Please note that the program always uses 26 capital letters of the German alphabet.

Please note that if a new combination appears, you have to click with your mouse on the first of the three white boxes. Otherwise, no input is possible!

Please press OK to continue.

[Screen 4]

Bear in mind, after wrong inputs:

- The current combination to encode will not change until a correct input was made.
- However, your previous inputs (in the 3 boxes below the capital letters) will all be deleted.
- Furthermore, the table stays unaltered, meaning that the allocated numbers remain identical. Also, the position of the capital letters in the table does not change.

Please press OK to continue.

[Screen 5]

Task 1 - Trial period

The task starts with a trial period in which each participant has to encrypt exactly ten combinations.

Please note:

- Correct solutions do not lead to payments in the trial period.
- The general idea of the trial period is to make you as familiar as possible with the task before the actual experiment begins.

Therefore you should take the trial period seriously and try to solve the ten combinations as fast as possible!

Please raise your hand if you still have further questions. We will come to your desk and answer them individually.

Please press OK to continue.

[Screen 6]

ENCRYPTION TASK. SEE FIGURE 8.

[Screen 7]

Task 1 - Paid period

In the paid period each participant has 8 minutes to encrypt as many combinations as possible. After the 8 minutes, you will be ranked according to the number of combinations encrypted relative to all participants.

There are 24 participants in this experiment. Participants who are ranked among the top 12 performers will get a payment of 15 euros, whereas participants who are ranked among the bottom 12 performers will get a payment of 10 euros

Please press OK to continue.

[Screen 8]

ENCRYPTION TASK. SEE FIGURE 8.

[Screen 9]

You are among the upper 12 participants [lower 12 participants] and receive an envelope with 15 [10] euros.

After you press OK we will begin distributing the money that you earned in task 1.

Press OK when you are ready to continue.

[Screen 10]

Task 2

There is a six-sided die on your desk. We ask you to roll it in private once after you read the instructions.

Please do not roll the die before you are not told to do so.

After you rolled the die we will ask you to enter the rolled number into the computer.

You will lose money equivalent to the number reported by you. If you report "1" you will lose 1 euro, if you report "2" you will lose 2 euros, if you report "3" you will lose 3 euros etc.

[Just people with 10 euros envelopes see this]

Number thrown	1	2	3	4	5	6
Money you keep	9€	8€	7€	6€	5€	4€

[Just people with 15 euros envelopes see this]

Number thrown	1	2	3	4	5	6
Money you keep	14€	13€	12€	11€	10€	9€

[Everyone sees this]

After you reported your dice roll, you will take your earnings from the envelope and give the envelope with the remaining money back to the experimenter.

Press OK to begin with task 2.

[Screen 11]

Please roll the die once now

Remember the number you rolled

Press OK when you are finished

[Screen 12]

Task 2

Enter the rolled number now: _______

Press OK when you are finished

[Screen 13]

You absolved all the tasks of the experiment.

Please fill out the survey before you leave the room for payment

Bring the envelope with the remaining [reported die roll] to the payout. We will count the remaining money.

Press OK to start the survey.

[Screen 14]

Please answer the following question:

In task 1 your task was to encrypt as many combinations as possible

You were under the upper [lower] 12 participants.

What do you think was your exact rank in task 1? ________

If you guess correctly, you will receive 1 euro in addition to your earnings.

Press OK after you have typed in your guess.

[Screen 15]

You guessed that you were ranked number X in task 1. Your actual rank was Y.

[$X = Y$]

You will receive 1 euro in addition to your experimental earnings.

[$X \neq Y$]

You will not receive any additional earnings.

[Everyone sees this]

Press OK to proceed to the last part of the survey.

[Screen 16]

Survey

Please describe briefly how you made your decisions in the experiment ________

Age ________

Gender ________

Field of study ________

Study degree ________

Semester ________

Native language ________

B.0.2 Instructions CONTROL

We only show the screens that differ from DESERVE.

[Screen 7]

Task 1- Paid period

In the paid period each participant has 8 minutes to encrypt as many combinations as possible. After the 8 minutes, you will be ranked according to the number of combinations encrypted relative to all participants.

There are 24 participants in this experiment. Participants who are ranked among the top 12 performers will get a payment of 1 euro, whereas participants who are ranked among the bottom 12 performers will not earn any money.

Please press OK to continue.

[Screen 9]

You are among the upper 12 participants [lower 12 participants] and receive 1 [0] euro.

Press OK when you are ready to continue.

[Screen 9a]

Task 2

Now, we will go around with a bag with 12 white balls and 12 yellow balls. You will draw one ball from the bag without looking, and you will keep it with you. Before doing that, we will show you that the bag contains the same proportion of white and yellow balls.

If you draw a white ball, you will get an envelope with 10 euros. If you draw a yellow ball, you will get an envelope with 15 euros.

One of the experimenters will go to your computer and will personally enter the type of envelope according to the color of your ball and give you the envelope.