

# **Interpreting behavior of agents in Gneezy's cheap-talk game**

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## **Abstract**

Dishonesty and distrust are serious social and economic challenges facing societies with billions of US dollars lost each year due to income-tax evasion, insurance fraud, and substantial monitoring costs. The overarching aim of this thesis was to analyze the two behaviors of interest in Gneezy's (2005) cheap-talk game. Specifically, we explore if the behavior of senders in Gneezy's game can be interpreted as honest or dishonest and if the behavior of receivers can be interpreted as trusting or untrusting.

What makes Gneezy's game particularly appealing is that the experimenter has full knowledge of the actions of every agent, making it possible to study, in the same game, honest and trusting behaviors in relation to the agents' personal and personality characteristics, which could be important in explaining heterogeneity in honesty and trust. Therefore, if applicable, Gneezy's game could be valuable to those researching honesty and trust as an additional behavioral measure, where the agents play against an actual and specific adversary.

Evidence from multiple studies provided support for the validity of this interpretation of actions by agents in Gneezy's game, specifically in a slightly modified form. For senders, aggregated multiple observations for their behavior correlated satisfactorily with the Honesty-Humility personality factor indicating that both instruments were measuring the same concept. Additionally, when receivers were prompted that by not making a promise senders could be issuing a warning to receivers that they might deceive them, the results indicated a strong correlation between the behavior of receivers and a measure of target-specific trust.

Consequently, Gneezy's game could be extremely useful to study honesty and trust and help understand economic, financial, and social activities.



## Ágrip

Óheiðarleiki og vantraust eru alvarlegar félagslegar og efnahagslegar áskoranir sem samfélög standa frammi fyrir þar sem milljarðar bandaríkjadala tapast á hverju ári vegna skattsvika, tryggingasvika og verulegs effirlitskostnaðar. Markmið þessa doktorsverkefnis var að kanna hvort hægt væri að túlka hegðun sendenda í mælileik Gneezy (2005) sem heiðarlega eða óheiðarlega og hvort hægt væri að túlka hegðun viðtakenda sem lýsingu á trausti eða vantrausti.

Það sem gerir leik Gneezy (2005) einstaklega aðlaðandi er að rannsakandi hefur fulla þekkingu á hegðun sérhvers leikmanns sem gerir það mögulegt að kanna, í sama leiknum, bæði heiðarleika og traust í tengslum við bakgrunn og persónuleika leikmanna sem gæti nýst í að skýra þann breytileika sem er til staðar í heiðarleika og trausti. Að því gefnu þá gæti leikur Gneezy reynst verðmæt viðbót við aðra hegðunarmælingar fyrir þá sem eru að rannsaka heiðarleika og traust við þær aðstæður þar sem leikendur leika við raunverulegan og tiltekinn andstæðing.

Niðurstöður þessa verkefnis styðja við réttmæti þeirrar túlkunnar að hægt sé að túlka hegðun sendenda og viðtakenda sem annars vegar heiðarlega og hins vegar trausta. Fyrir sendendur hafði samanlagður fjöldi athugana um hegðun þeirra ásættanlega fylgni við persónuleikabáttinn heiðarleika og auðmýkt sem gefur til kynna að bæði mælitækin hafi verið að mæla sama hugtakið. Að auki, þegar viðtakendum var gert ljóst að sendendur gætu verið að vara við því að treysta þeim með því að lofa viðtakendum engu þá var fyrir viðtakendur sterk fylgni á milli hegðunar þeirra og sértæks trausts.

Að þessu sögðu þá gæti leikur Gneezy (2005) verið mjög gagnlegur til að kanna heiðarleika og traust.



## **Acknowledgements**

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# 1 Introduction

This thesis is interdisciplinary in nature and links incentivized and self-report measures of behavior. I explore if the behavior of senders in Gneezy's (2005) cheap-talk game can be interpreted as honest and if the behavior of receivers can be interpreted as trusting. Specifically, I report on associations between self-report measures and behavioral measures of honesty and trust in multiple samples. The thesis thus consists of two separate parts. First, it explores the association between a widely used self-report measure of honesty and the behavior of senders in Gneezy's cheap talk game. Second, it explores the associations between a widely used self-report measures of trust and the behavior of receivers in Gneezy's cheap-talk game.

In this thesis, Paper I acts as a conduit for subsequent papers by proposing that self-reported personality measures could be used to explain the behavior of senders in Gneezy's (2005) game. However, in Paper II of this thesis we find that the behavior of senders did not correlate with the Honesty-Humility personality factor which begs the question if it is valid to interpret the behavior of senders as honest. Given the importance of validity in researchers' interpretation of outcomes, such as interpreting the behavior of actors in Gneezy's game, Papers III and IV describe amended versions of Gneezy's game to subsequently test if the altered versions might yield stronger associations with the Honesty-Humility personality factor. In line with the principle of aggregation, Paper III uses multiple observations of senders' behavior to test if there might be a stronger correlation between the aggregated measure of behavior and the Honesty-Humility personality factor. And in Paper IV, the self-reported Honesty-Humility personality factor is compared to the behavior of senders elicited under two different treatments, both intended to elicit guilt which should in turn contribute to honesty.

In Papers V and VI the focus of the thesis shifts to the behavior of receivers in Gneezy's (2005) game. In Paper V, like in Paper II, the authors discovered that the behavior of receivers could not easily be interpreted as trusting, that is the behavior did not in this case correlate with measures of generalized trust, and only weakly with measures of target-specific trust. Consequently, in Paper VI, the thesis reports on a study where senders were provided an additional, unconcealed option that included a promise. This was done to test if an optional promise would lead to a stronger association between the receivers' behavior and how much they indicate trusting their senders.

Thus, my overarching aim in this thesis was to examine if the behavior of agents in Gneezy's (2005) game could be interpreted as honest or trusting. What this thesis demonstrates is that the behavior of agents in Gneezy's game can be interpreted as honest and trusting, if only by tweaking the game a little.

## **1.1 Gneezy's cheap-talk game**

Honesty and trust are multidimensional concepts that have been defined in a variety of ways (Glaeser et al., 2000; Grover, 2005; Levine & Cohen, 2018; McEvily & Tortoriello, 2011; McEvily et al., 2012; Simpson, 2012). Accordingly, numerous measures have been developed to assess honest and trusting behaviors, including self-report measures of honesty that rely on an individual's self-perceptions of their behavior (HEXACO personality inventory, Ashton & Lee, 2009), and behavioral tasks that measure overt behavior related to specific dimensions of honesty (Fischbacher and Föllmi-Heusi, 2013). Although self-report and behavioral measures have been extensively studied in separate contexts, they are rarely used together, and little is known about how they relate to each other (Reynolds et al., 2006). In the present thesis I report on studies that used multiple samples to investigate relations between self-report measures of honesty and trust and the behavior of actors in Gneezy's (2005) cheap-talk game. Although Gneezy's (2005) game is one of the most widely cited behavioral measure of deception in economics (with about 800 citations on Web of Science and 2000 on Google Scholar), it has never been tested if it is valid to interpret the behavior of senders and receivers as honest and trusting.

In Gneezy's game two players, the sender and the receiver, play a single game anonymously. The sender is asked to send the receiver either of two messages: "Option A will earn you more money than option B" or "Option B will earn you more money than option A". Only the sender is informed of the monetary payoff associated with each option ("Option A: ISK 500 to you and ISK 1,000 to the other student" or "Option B: ISK 1,000 to you and ISK 500 to the other student"), but the receiver must choose between options A and B based exclusively on the message he receives. One of the messages is unmistakably false and therefore the sender must decide whether to send a false message that will benefit him financially if it is followed. However, the receiver will have to base his decision only on the message sent to him without knowing the monetary payoff of either. The two options, therefore, result in different payoffs for both players, but the receiver's choice alone decides the payment for both players. For example, if the receiver chooses option A, the receiver earns more than the sender. However, if the receiver chooses option B, the receiver earns less than the sender.

As only the first message is true, individuals that send the second message are designated as lying, as they sent a message that has typically been interpreted as a dishonest message (Cohen et al., 2009; Fischbacher & Föllmi-Heusi, 2013; Gibson et al., 2013; Hershfield et al., 2012; Mazar & Ariely, 2006). Additionally, the behavior of receivers in Gneezy's (2005) game has been described as trusting if receivers chose the option their sender recommended (Childs, 2012; Croson & Gneezy, 2009; Dreber & Johannesson, 2008; Ergun et al., 2012; Gylfason et al., 2013; Peeters et al., 2008; Sutter, 2009).

## **1.2 Honesty and Gneezy's game**

In relevance to Gneezy's (2005) cheap-talk game, honesty has been defined as "a tendency not to lie, cheat, or steal" (Grover, 2005, p. 148), or to speak "in accordance with one's own beliefs, thoughts and feelings" (Levine & Cohen, 2018, p. 1401). Given that dishonesty is a serious social and economic challenge facing societies with billions lost due to income-tax evasion and insurance fraud, being able to detect dishonesty is, therefore, valuable in both economic and social settings (Mazar and Ariely, 2006).

The measurement of honesty in economics has traditionally depended mostly on behavioral measures, consistent with using choice in inferring preferences. Widely used behavioral measures such as deception games (Gneezy, 2005) and cheating games (Fischbacher and Föllmi-Heusi, 2013) offer the opportunity to examine revealed preferences rather than stated preferences. In the cheating games (e.g. dice rolling) the participant plays the game against the experimenter who has no actual knowledge of whether or not the participant lied. In the deception games, however, the sender plays against an actual and specific adversary who bears the full cost of following a deceptive message. The sender does not play the game against the experimenter or a group of people upon whom he or she may inflict some social cost. Furthermore, what makes the deceptions games particularly appealing is that the experimenter has full knowledge of the actions of every sender, making it possible to study honest behavior in relation to the sender's personal (Childs, 2013) and personality characteristics (Gylfason et al., 2013), which could be important in explaining heterogeneity in honesty.

In Gneezy's (2005) game, the sender has the option of sending a deceptive message to a receiver without any consequences or retaliation. That message – a lie – has typically been interpreted as a dishonest message (e.g. Fischbacher & Föllmi-Heusi, 2013; Mazar & Ariely, 2006). However, according to Sutter (2009), telling the truth should count as an act of deception when the sender anticipates that the receiver will not follow his message (Gneezy et al., 2013), which would make it difficult to interpret the sender's behaviors as dishonest without further empirical evidence.

### 1.3 Trust in Gneezy's game

Trust is valuable and has important implications for economic performance (Buchan et al., 2008; Johansson-Stenman et al., 2005; Zak & Knack, 2001). Transaction costs in the form of monitoring costs are higher where trust is low, and thus, resources are not used in the most efficient manner (Knack & Keefer 1997). Therefore, it is important to measure it accurately and reliably.

Trust can however be difficult to define and measure (Glaeser, Laibson, Scheinkman, & Soutter, 2000; McEvily & Tortoriello 2011; McEvily et al., 2012; Simpson, 2012). Smedslund's (1997) simple definition of trust is somewhat tailored to how valuable trust is for economic performance. His definition of trust is: if Helen trusts Alexandra, then Helen believes Alexandra will not do anything bad to Helen. And hence, Helen does not have to spend limited resources monitoring Alexandra or take out an insurance to guard against her.

In 2012, McEvily et al. introduced the distrust game, an innovative behavioral measure of trust, where participants can pay to avoid being financially vulnerable to the decisions of their counterparts. McEvily et al., furthermore, called for additional behavioral measures on trust to supplement both Berg's et al. (1995) investment game (a behavioral measure using choice to infer preference) and various attitudinal measures on trust, where beliefs are surveyed to give insight into what people would do in a given situation.

In several papers, the behavior of receivers in Gneezy's (2005) cheap-talk game has been described as trusting if they chose the option their sender recommended (Childs, 2012; Croson & Gneezy, 2009; Dreber & Johannesson, 2008; Ergun et al., 2012; Gylfason et al., 2013; Peeters et al., 2008; Sutter, 2009). Dreber and Johannesson (2008), for example, used Gneezy's cheap-talk game in their experiment to "test for a difference in lying and trusting behavior between men and women." (p. 198). Moreover, they offered this as an operationalization of trust: "The extent to which receivers trusted the message of the sender was measured as the fraction of individuals following the advice offered by the sender." (p. 197). It appears that this interpretation of the behavior of receivers as trusting was merely an addition by various authors (e.g. Childs, 2012; Dreber & Johannesson, 2008; Gylfason et al., 2013; Peeters et al., 2008), as they never tested specifically whether it was valid to describe the behavior of senders as trusting or distrusting. If applicable, however, this addition could be valuable to research on trust as an additional behavioral measure. For one thing, Gneezy's (2005) cheap-talk game is simpler to administer than both the distrust game (McEvily et al., 2012) and the investment game (Berg et al., 1995).

## 1.4 Validity

Validity of a test measure is “the degree to which evidence and theory support the interpretations of test scores entailed by the proposed uses” of said measure (American Education Research Association, American Psychological Association, and National Council on Measurement in Education, 1999, p. 9). In this regard, validity, also referred to as construct validity, is both related to researchers’ interpretation of the outcome and proposed uses of the outcome. Therefore, the behavior of e.g., senders in Gneezy’s game (2005) might be interpreted as lying, but is lying in Gneezy’s game truly predictive of dishonesty and as such useful in distinguishing between e.g., which gender is more dishonest (Capraro, 2018)? After all, Gneezy created his game to study deception and using deception in games is not always dishonest (e.g. bluffing in poker) (Erat & Gneezy, 2012; Sutter, 2009). Consequently, Sutter raises an interesting point when he explains that even telling the truth could be dishonest in Gneezy’s game if the sender expects the receiver to choose opposite to what he would suggest.

Additionally, the validity of an outcome’s interpretations is based on evidence and theory. Gneezy (2005) never suggested that his game could be used to measure e.g., trust with the behavior of receivers. Therefore, that interpretation of receivers’ behavior is uncertain since it was an addition by various authors (Childs, 2012; Dreber & Johannesson, 2008; Gylfason et al., 2013; Peeters et al., 2008), and never tested specifically, nor based on a theory.

Lastly, validity is a matter of degree. That means that the interpretation of an outcome is not thought of as valid or not, rather how strong the evidence behind the interpretation is. The more empirical evidence that is available to support the interpretation the better. It would not be enough to rely only on face validity which “refers, not to what the test actually measures, but to what it appears superficially to measure.” (Anastasi & Urbina, p. 117). For example, the behavior of senders in Gneezy’s (2005) game fits well with Grover’s (2005) definition of honesty of not lying, cheating, or stealing but, then again, according to Sutter (2009) in sender-receiver games “interpreting the truth-telling as an act of honesty will be misleading in many cases.” (p. 48). This subtle thought by Sutter makes it imperative to collect objective data to find out if there is strong evidence to support the interpretation of the behavior of senders as dishonest (Cohen et al., 2009; Fischbacher & Föllmi-Heusi, 2013; Gibson et al., 2013; Hershfield et al., 2012; Mazar & Ariely, 2006). And the same applies to the behavior of receivers, before interpreting their behavior as trusting (Childs, 2012; Croson & Gneezy, 2009; Dreber & Johannesson, 2008; Ergun et al., 2012; Gylfason et al., 2013; Peeters et al., 2008; Sutter, 2009).

## 1.5 Aims

The purpose of this thesis is, therefore, to provide an analysis of the two measures of behavior of agents in Gneezy's (2005) cheap-talk game. Specifically, I compare an incentivized measure of senders' behavior with a self-reported measure of honesty (The Honesty-Humility scale; Ashton & Lee, 2009), in addition to comparing the behavior of receivers with a self-report measures of trust (e.g. Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people?; Johnson & Mislin, 2012). In terms of policy, these measures could be used to study serious social and economic challenges such as tax evasion and insurance fraud (Mazar & Ariely, 2006; McLeish & Oxoby, 2007) and help understand economic, financial, and social activity (McEvily et al., 2012).

First, it is important to find out the extent to which the behavior measures and self-report measures of honesty (as well as for trust) identify a common behavioral characteristic by assessing their correlation. If they do, both measures could be used to identify individual characteristics. However, if those instruments are not associated it would indicate that they might not share a common behavioral attribute and warrant further research aimed at discovering why these measures might differ (McLeish & Oxoby, 2007).

Second, multiple observations of behavior might yield stronger results with self-report measures (Funder & Block, 1989; Rushton et al., 1983). In Gneezy's (2005) game, agents' preferences are inferred by a dichotomous choice. Consider assessing any course performance with a single dichotomous-choice item. How reliable would that be? Not that reliable according to the principle of aggregation (Peterson, 2002). The principle states that "the sum of a set of multiple measurements is a more stable and unbiased estimator than any single measurement from the set. One reason is that there is always error associated with measurement. When several measurements are combined, these errors tend to average out, thereby providing a more accurate picture of relationships in the populations." (Rushton et al., 1983, pp. 18-19). Consequently, if the focus is on low correlation coefficients (.20 to .30) between self-report measures and a single measure of behavior, that could lead to misleading interpretations. However, larger correlations coefficients between an aggregated measure of behavior and self-reported measure of similar behavior would support the interpretation that both measures were measuring the same concept (Peterson, 2002; Rushton et al., 1983).

Third, decision making is influenced by affective states (Loewenstein, 1996; McLeish & Oxoby, 2007; Whiteside & Lynam, 2001). For example, McLeish and Oxoby reported a significant association between self-report measures of

impulsivity (BIS-11) and the behavior from an incentivized economics discount rates game, but only for participants that had been primed with negative feedback. Similarly, Erat and Gneezy (2012) suggested that there might be an underlying psychological process – guilt –which contributes to honesty, and assume that the association between lying and honesty is influenced by this negative affect. Thus, the self-reported Honesty-Humility measure is compared to the behavior of senders elicited under two different guilt inducing treatments. That is, we identify the conditions, related to affective states, where the self-report measure of honesty and the behavior of senders are most closely aligned.



## 2 Summary of methods, results, and discussions

This section provides a summary of the aims, methods and results pertaining to each paper.

### 2.1 Paper I

Gylfason, H. F., Arnardottir, A. A., & Kristinsson, K. (2013). More on gender differences in lying. *Economics Letters*, 119, 94-96.<sup>1</sup>

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#### 2.1.1 Aim

Building on two experiments using Gneezy's (2005) cheap talk sender and receiver game, the motivation for Paper I was to test for gender differences in deception. Dreber and Johannesson (2008) found that men were more likely to lie than women, whereas Childs (2012) found that men and women were equally likely to lie. Childs argued that these ambivalent results might be in line with Croson and Gneezy's (2009) general findings that "...[w]omen are found to be more responsive to payoffs and the opportunity cost of altruism" (p. 148). In Dreber and Johannesson, the opportunity cost was quite low, but it was much higher in Childs. The focus of this paper was, therefore, to test Childs' conclusion, that women may have a greater aversion to lying than men when the monetary gain is small.

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<sup>1</sup> Haukur Freyr Gylfason and Kari Kristinsson designed and organized the study with input from Audur Arna Arnardottir. Haukur Freyr Gylfason and Kari Kristinsson collected the data. Haukur Freyr Gylfason was responsible for the data analysis and writing of the manuscript with input from Kari Kristinsson. All co-authors made revisions to the article for relevant scientific and intellectual content.

### **2.1.2 Method**

In total, 368 undergraduates (184 receivers and 184 senders) took part in Gneezy's (2005) cheap-talk game (see introduction for more information).

### **2.1.3 Results**

Unlike Dreber and Johannesson (2008), but like Childs (2012), equal percentage of male (45.2%) and female (43.0%) senders lied to secure monetary benefits,  $\chi^2(1, N = 184) = 0.09, p = .761$ . Most receivers (78%) chose the option the sender recommended.

### **2.1.4 Discussion**

The goal of Paper I was to try to gauge Childs' (2012) reasons for the conflicting results between his experiment and Dreber and Johannesson's (2008) experiment, where men were more likely than women to lie in Dreber and Johannesson's experiment, but equally as likely in Childs' experiment. We follow up on Childs' possible explanation in Paper III where we test if women may have a greater aversion to lying than men for smaller rather than larger monetary gains.

## **2.2 Paper II**

Gylfason, H. F., Halldorsson, F., & Kristinsson, K. (2016). Personality in Gneezy's cheap talk game: The interaction between Honesty-Humility and Extraversion in predicting deceptive behavior. *Personality and Individual Differences, 96*, 222-226.<sup>2</sup>

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### **2.2.1 Aim**

In Paper I, we suggested that personality might affect the decision that individuals make. Building on Paper I, we follow Hilbig and Zettler (2015) who took on the task of bridging the gap between deceitful behavior and personality research. Hilbig

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<sup>2</sup> Haukur Freyr Gylfason and Kari Kristinsson designed and organized the study with input from Freyr Halldorsson. Haukur Freyr Gylfason was responsible for the data analysis and writing of the manuscript with input from Kari Kristinsson and Freyr Halldorsson. All co-authors made revisions to the article for relevant scientific and intellectual content.

and Zettler based their research on, among other, Hershfield et al. (2012) explaining that their study was, at that time, the only study to correlate the Honesty-Humility personality factor with actual dishonest behavior. Individuals scoring low on the Honesty-Humility personality factor are willing to obtain economic gains by cheating or stealing to manipulate and flatter others or by pretending to like them (Ashton et al., 2007). In the context of Gneezy's (2005) game, if the behavior of senders correlates with the Honesty-Humility personality factor that would indicate that its interpretation as dishonest might be warranted. Furthermore, we investigated whether the Extraversion personality factor moderates the relationship between Honesty-Humility and the behavior of senders.

### **2.2.2 Method**

In total, 143 senders participated in Gneezy's (2005) game. After playing the game, senders responded to the NEO Five-Factor personality inventory and the Honesty-Humility scale.

### **2.2.3 Results**

In total, 36% of the senders sent a deceptive message. However, Honesty-Humility did not correlate with the behavior of senders,  $r_p = -.13$ ,  $p = .12$ . A binary logistic regression revealed a statistically significant interaction for Honesty-Humility and Extraversion ( $p = .04$ ), demonstrating that for those who score high for Honesty-Humility, it is irrelevant whether they measured high or low for Extraversion with respect to their odds of sending a deceptive message in Gneezy's (2005) game.

### **2.2.4 Discussion**

We did not find support for our hypothesis that senders with low (as opposed to high) Honesty-Humility were more likely to send a deceptive message. In contrast to our results, Hilbig and Zettler (2015) and Hilbig et al. (2012) found a moderate association between Honesty-Humility and lying on the one hand, and the contribution in a public goods game on the other, in a situation similar to our game in that participants did not fear retaliation. Conversely, in line with previous research (Oh et al., 2011), the results confirmed the hypothesis that Honesty-Humility interacted with Extraversion in predicting deceptive behavior in Gneezy's (2005) game.

## 2.3 Paper III

Gylfason, H. F., Vésteinsdóttir, V., Kristinsson, K., Asgeirsdóttir, T. L., & Schram, A. (2023). Gender differences in lying: The role of stakes. *Economics Letters*, 222, 110926.<sup>3</sup>

### 2.3.1 Aim

Building on Papers I and II, the aim of Paper III was twofold. Using a within-subject design that included multiple observations of behavior per sender, we tested Childs' (2012) suggestion, that women may have a greater aversion to lying than men for smaller, rather than larger monetary gains. Secondly, building on the principle of aggregation, we test if the Honesty-Humility factor correlates with senders' behavior. According to Funder and Block (1989) and Rushton et al. (1983) multiple observations of behavior, compared to one-time interaction, can yield stronger results with self-report measures.

Table 2-1. The decision sheet for the senders in the amended cheap-talk game.

	Decisions	I choose to send (please check one option)
1	Option A: [500 ISK to you and 600 ISK to the other participant] Option B: [600 ISK to you and 500 ISK to the other participant]	<input type="checkbox"/> Message 1 <input type="checkbox"/> Message 2
2	Option A: [500 ISK to you and 1.000 ISK to the other participant] Option B: [1.000 ISK to you and 500 ISK to the other participant]	<input type="checkbox"/> Message 1 <input type="checkbox"/> Message 2
3	Option A: [500 ISK to you and 1.500 ISK to the other participant] Option B: [1.500 ISK to you and 500 ISK to the other participant]	<input type="checkbox"/> Message 1 <input type="checkbox"/> Message 2

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<sup>3</sup> Haukur Freyr Gylfason designed and organized the study with input from Vaka Vésteinsdóttir. Haukur Freyr Gylfason and Vaka Vésteinsdóttir collected the data. Haukur Freyr Gylfason was responsible for the data analysis and writing of the manuscript. All co-authors made revisions to the article for relevant scientific and intellectual content.

4	Option A: [500 ISK to you and 2.000 ISK to the other participant] Option B: [2.000 ISK to you and 500 ISK to the other participant]	<input type="checkbox"/> Message 1 <input type="checkbox"/> Message 2
5	Option A: [500 ISK to you and 2.500 ISK to the other participant] Option B: [2.500 ISK to you and 500 ISK to the other participant]	<input type="checkbox"/> Message 1 <input type="checkbox"/> Message 2
6	Option A: [500 ISK to you and 3.000 ISK to the other participant] Option B: [3.000 ISK to you and 500 ISK to the other participant]	<input type="checkbox"/> Message 1 <input type="checkbox"/> Message 2
7	Option A: [500 ISK to you and 3.500 ISK to the other participant] Option B: [3.500 ISK to you and 500 ISK to the other participant]	<input type="checkbox"/> Message 1 <input type="checkbox"/> Message 2
8	Option A: [500 ISK to you and 4.000 ISK to the other participant] Option B: [4.000 ISK to you and 500 ISK to the other participant]	<input type="checkbox"/> Message 1 <input type="checkbox"/> Message 2
9	Option A: [500 ISK to you and 4.500 ISK to the other participant] Option B: [4.500 ISK to you and 500 ISK to the other participant]	<input type="checkbox"/> Message 1 <input type="checkbox"/> Message 2
10	Option A: [500 ISK to you and 5.000 ISK to the other participant] Option B: [5.000 ISK to you and 500 ISK to the other participant]	<input type="checkbox"/> Message 1 <input type="checkbox"/> Message 2

### 2.3.2 Method

A total of 123 senders to part in our amended version of Gneezy's (2005) game. Senders were shown a decision sheet (see Table 1) that contained a series of 10

possible decisions. Each decision had the same two options as the standard Gneezy’s game with increased monetary gains for lying: Option A will earn you more money than option B or Option B will earn you more money than option A. For each decision, senders specified which message they prefer to send by selecting one of two boxes. Senders were informed that at the end of the experiment we would randomly draw a number from 1 to 10 and send the consequent message to an actual receiver, with the receiver’s choice alone determining the payment for both players.

After playing the game, senders answered the question “How much do you agree or disagree that you lied in any of your messages?” and completed the Icelandic version of the 60-item HEXACO Personality Inventory-Revised (Ashton & Lee, 2009).

### 2.3.3 Results

51 male and 71 female senders participated in the study, and one who did not report their gender. As can be seen in Fig. 1, 53% of the male senders lied in an attempt to secure the preferred option when the stakes were lowest; the same holds for 37% of female senders. The proportion of men and women that lied increased with the stakes, with women appearing less likely than men to lie for smaller stakes than higher,  $F(7.15, 858.25) = 2.29, p = .025$ , indicating an interaction between gender and stakes, supporting Childs’ (2012) hypothesis.

Gender did not correlate with ‘number of lies’, a summary measure of how often for the ten decisions senders sent a deceptive message,  $r_p = .005, p = .96$ . The Honesty-Humility measure correlates with ‘number of lies’,  $r_p = -.336, p < .001$ .

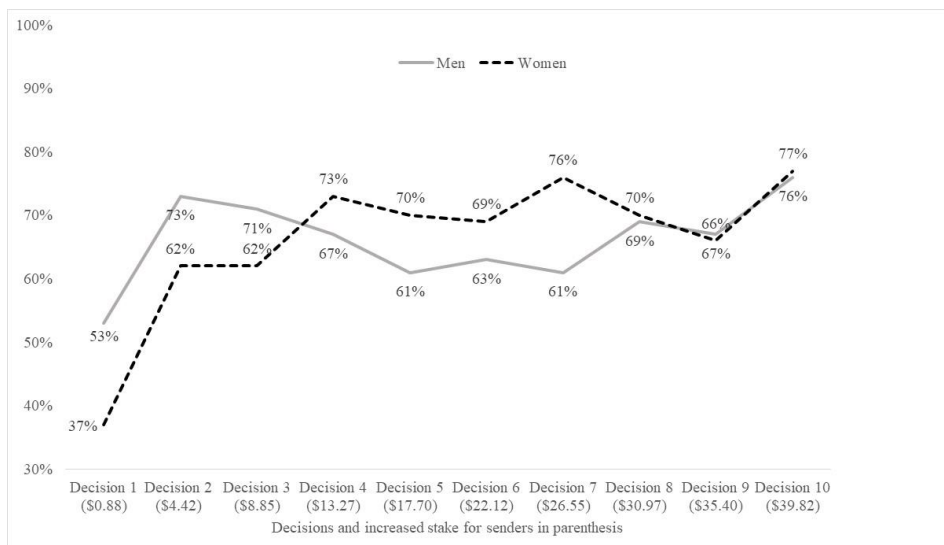


Figure 2-1. Percentages of all senders lying with increased stakes.

### **2.3.4 Discussion**

Similar to Erat and Gneezy (2012) and Gneezy (2005) our results indicate that willingness to lie increased with the stakes for both men and women. Our results, however, are in accordance with Childs' (2012) suggestion that women may have a greater aversion to lying for small stakes that disappears with increasing stakes.

Although sensitivity to stakes seemed to drive decisions to some extent, about 11% of senders never lied. Such lack of willingness to lie could be associated with guilt (Erat & Gneezy, 2012), which resonates well with our results seeing as guilt is associated with Honesty-Humility (Fang et al., 2019) and Honesty-Humility is associated with lying in our study.

Erat and Gneezy (2012) argue that people might experience guilt when lying because they would be violating a social norm. More specifically, that the amount of guilt people experience could be contingent on a descriptive norm – “their beliefs about adherence to the norm in their peer group.” (p. 730). Future research should address descriptive norms by e.g., assessing the relationship between conformity and deceptive behavior.

## **2.4 Paper IV**

Gylfason, H. F., Jonsdottir, B., Kristinsson, K., Asgeirsdottir, T. L., & Schram, A. (In prep). Do different social norms affect behavior in Gneezy's cheap-talk game? *Manuscript intended for publication in Games.*<sup>4</sup>

### **2.4.1 Aim**

Following Paper III, we test Erat and Gneezy's (2012) suggestion that there might be an underlying psychological process – guilt –which contributes to honesty. They assume that the association between lying and honesty is influenced by this negative affect. Thus, we compare self-reported Honesty-Humility measures to the behavior of senders elicited under two different treatments as injunctive and descriptive social norms. That is, we identify the conditions (which can be associated with affective states) under which the self-report measure of honesty and the behavior of senders are most closely aligned.

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<sup>4</sup> Haukur Freyr Gylfason designed and organized the. Haukur Freyr Gylfason and Bessi Jonsdottir collected the data. Haukur Freyr Gylfason and Bessi Jonsdottir were responsible for the data analysis and writing of the manuscript. All co-authors made revisions to the article for relevant scientific and intellectual content. This Paper was part of Bessi Jonsdottir's BSc thesis which Haukur Freyr Gylfason supervised.

### **2.4.2 Method**

A total of 69 senders took part in the experiment using Gneezy's (2005) game, 35 in the injunctive norms group and 34 in the descriptive norms group. As in Erat and Gneezy (2012) the experiment was conducted in a classroom setting, and the senders were randomly assigned to two conditions by social norms. For injunctive social norms, participants were exposed to a short paragraph that read "Before you decide which message to send, we would like to inform you that around 3% of Icelanders believe that lying for your own interests can be justified." (European Values Study, 2008). For descriptive social norms participants were exposed to a short paragraph that read "Before you decide which message to send, we would like to inform you that around 65% of students participating in this kind of study in Iceland lie for their own interest." (From Paper III).

### **2.4.3 Results**

In total, 40.6% of senders sent a deceptive message. In line with previous authors' interpretation of the behavior of senders as dishonest (e.g., Capraro, 2018; Fischbacher & Föllmi-Heusi, 2013; Mazar & Ariely, 2006), we found, for the first time, that the lying behavior of senders correlated significantly and meaningfully with their score on Honesty-Humility,  $r_p = -.33$ ,  $p = .006$  (while controlling for social norms).

### **2.4.4 Discussion**

Given the emphasis on interpreting the behavior of senders as (dis)honest in Gneezy's (2005) cheap-talk game (e.g., Capraro, 2018; Fischbacher & Föllmi-Heusi, 2013; Mazar & Ariely, 2006) we felt it important to correlate senders' decision and Honesty-Humility, especially concerning Gylfason et al. (2016) disheartening non-significant results. Our results indicate that Gneezy's game appears to be a valid measure of (dis)honesty, as senders with low Honesty-Humility were more likely to send a deceptive message. To the best of our knowledge, this is the first study to report a statistically significant association between the behavior of senders and their scores on a personality trait measuring (dis)honesty. We believe that these findings are empirically important for they indicate, for the first time, that the behavior of senders in Gneezy's (2005) game can be interpreted as (dis)honest.

## 2.5 Paper V

Gylfason, H. F., & Olafsdottir, K. (2017). Does Gneezy's cheap talk game measure trust? *Journal of Behavioral and Experimental Economics*, 67, 143-148.<sup>5</sup>

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### 2.5.1 Aim

Following my interpretation of the behavior of receivers in Gneezy's game (2005) as trusting in Paper I, I thought it important to try to validate that interpretation seeing as it had never been done. Therefore, in the first study, we gave receivers the option of buying information on previous game behavior of their sender. In the second study, we compared the actions of the receivers to their answers to the World Values Survey question on trust (Johnson and Mislin, 2012), and in the third study, we used a target-specific measure of trust and compared it to the actions of the receivers (McEvily et al., 2012).

### 2.5.2 Measures

In Study 1, 87 receivers participated in an experiment where they were randomly assigned to a comparison group and an experimental group. The comparison group took part in a standard Gneezy's (2005) cheap-talk game. The experimental group read the same instruction as the comparison group; however, they were additionally given the opportunity to pay for information on the previous behavior of their sender in another cheap-talk game (indicating trustworthiness of their sender).

In Study 2, receivers were asked the World Values Survey question on trust: "Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people?" before taking part in Gneezy's (2005) game.

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<sup>5</sup> Haukur Freyr Gylfason designed and organized the study. Haukur Freyr Gylfason collected the data. Haukur Freyr Gylfason was responsible for the data analysis and writing of the manuscript. All co-authors made revisions to the article for relevant scientific and intellectual content.

In Study 3, 100 receivers answered a composite measure of generalized trust (Glaeser et al., 2000; Gächter et al., 2004) before taking part in Gneezy's (2005) game. After making their decision, receivers answered a target specific question on trust "I felt that I could not trust the other participant". The answers ranged from 1 (very well) to 5 (very badly).

### **2.5.3 Results**

In Study 1, there was a clear difference in behavior between groups ( $\chi^2(1, N = 87) = 12.84, p < .001$ ). In the comparison group 91% of the receivers chose the option the sender recommended with 57% of the receivers in the experimental group choosing the option the sender recommended.

Most receivers (76%), in Study 2, chose the option their sender recommended. However, the behavior of receivers did not correlate with their answer on the World Values Survey question ( $r_p = .14, p = .25$ ).

In Study 3, 74% of receivers chose the option their sender recommended. As in Study 2, the behavior of receivers did not correlate with their answer on a generalized measure of trust ( $r_p = .09, p = .37$ ), however, receivers behavior correlated weakly with their answers on the target specific question on trust ( $r_p = .20, p = .04$ ).

### **2.5.4 Discussion**

In these three studies, we find evidence that casts doubt that the behavior of receivers and their self-report measures of trust were measuring the same concept.

## **2.6 Paper VI**

Gylfason, H. F., Kristinsson, K., Asgeirsdottir, T. L., & Schram, A. (In prep). Trust me. I promise! *Manuscript intended for publication in Economics Letters*.<sup>6</sup>

### **2.6.1 Aim**

Giving how accessible Gneezy's (2005) game is to receivers and researchers and following McEvily et al. (2012) call for additional behavioral methods on trust, the purpose of Paper VI was to see if it was possible to tweak the game so that it would

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<sup>6</sup> Haukur Freyr Gylfason designed and organized the study. Haukur Freyr Gylfason collected the data. Haukur Freyr Gylfason was responsible for the data analysis and writing of the manuscript. All co-authors made revisions to the article for relevant scientific and intellectual content.

be useable to study trust. We provided senders with additional, unconcealed options of a promise. If receivers are aware that senders might experience more guilt following a promise if they lie (Charness & Dufwenberg, 2006) or by not making a promise senders could be issuing a warning to receivers (Barolomeo et al., 2019) it could lead to a stronger association between the receivers' behavior and how much they indicate trusting their senders.

### **2.6.2 Measures**

In a standard Gneezy's (2005) game a sender is asked to send the receiver one of two messages (see Introduction). In our amended version, the sender had the additional option of promising the receiver that either option is better by sending the receiver one of four messages:

Message 1: "Option A will earn you more money than option B."

Message 2: "I promise that option A will earn you more money than option B."

Message 3: "Option B will earn you more money than option A."

Message 4: "I promise that option B will earn you more money than option A."

After playing the game, 95 receivers were asked to rate how much they trusted their sender (target-specific trust question) and a composite measure of generalized trust (Glaeser et al., 2000; Gächter et al., 2004).

### **2.6.3 Results**

Most receivers (67%) chose the option their sender recommended and there was a strong correlation between receivers choosing the option their sender recommended and their responses to the target-specific question on trust ( $r_p = .51$ ,  $p < .001$ ). However, as expected, receivers' behavior did not correlate with the generalized measure of trust ( $r_p = .11$ ,  $p = .29$ ).

### **2.6.4 Discussion**

The aim of this study was to introduce a slightly amended version of Gneezy (2005) cheap-talk game that could be used to measure trust. The results indicate that the behavior of receivers can be interpreted as trusting if they choose the option their sender recommended, which is in stark contrast to Gylfason and Olafsdottir's (2017) findings.



## **3 Papers**

This PhD thesis contains six papers either published or submitted for publication.

### **3.1 Paper I: More on gender differences in lying**





## More on gender differences in lying

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### ABSTRACT

Responsiveness to payoffs and differences in culture have been considered as reasons why women have a greater aversion to lying than men. By using smaller stakes in a sender–receiver game than Dreber and Johannesson, but similar culture, no gender difference was found.

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## 1. Introduction

Numerous experiments have demonstrated large and consistent deviations from the theoretical assumption that individuals are entirely self-interested (Camerer, 2001; Fehr and Gächter, 2000; Roth et al., 1991) and frequently choose not to maximize their own gains when able to do so (Charness and Gneezy, 2008). One such deviation is the apparent aversion towards lying. A growing body of literature has found that a substantial proportion of people prefer not to lie, even when monetary benefits are at stake (Gneezy, 2005; Sutter, 2009).

Recently, two experiments using a cheap talk sender and receiver game have revealed contradicting results when it comes to gender differences regarding deception. Dreber and Johannesson (2008) found that men were more likely to lie than women, whereas Childs (2012) found that men and women were equally likely to lie. Childs' reasoning was that these ambivalent results may be in line with Croson and Gneezy's (2009) general findings that "...[w]omen are found to be more responsive to payoffs and the opportunity cost of altruism" (p. 148). In Dreber and Johannesson, the opportunity cost was quite low, but it is much higher in Childs. Childs also argues that the difference between the two experiments could be country or culture specific, which

is in line with the mounting evidence of cross-country/culture behavioural differences in economic experiments (Anderson et al., 2011; Henrich et al., 2001).

Using the same experimental design as Dreber and Johannesson (2008) and a similar one to Childs (2012), data was collected from students at Icelandic universities to test Childs' first conclusion, that women may have a greater aversion to lying than men when the monetary gain is small, and to gain insight into his second conclusion, which is that the gender difference could be culture specific. Below is a description of the experimental design, followed by results and concluding remarks.

## 2. Experimental design

The same experimental design was used in this experiment as in Gneezy (2005) and in Dreber and Johannesson (2008). Two individuals in different rooms were paired anonymously. Below, these individuals are referred to as "sender" and "receiver". The receiver must choose between either option A or B without knowing the monetary payoffs from these actions. These two options lead to different payoffs for each player. If the receiver chooses option A, the sender earns ISK 500 and the receiver earns ISK 600 (ISK = Icelandic kronor; US \$1 ≈ ISK 115). However, if the receiver chooses option B, the sender earns ISK 600 while the receiver earns ISK 500. The only information the receiver has is a message from the sender stating that either option A or option B is better for the receiver. This is done by having the sender, who

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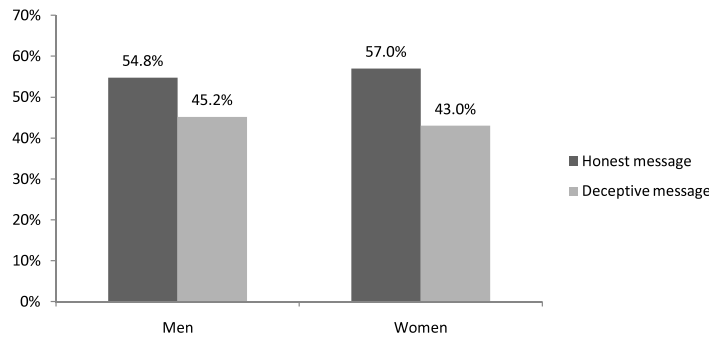


Fig. 1. The percentages of men and women sending deceptive messages.

is informed about the monetary payoffs from either choice, send a message to the receiver stating either “Option A will earn you more money than option B” or “Option B will earn you more money than option A”. As only the first message is true, individuals that send the second message are designated as lying. This game also allows for measuring trust, with the fraction of receivers that followed that message from the sender being a measure of trust.

The study was carried out on 368 undergraduates from the University of Iceland and the University of Reykjavik (184 receivers and 184 senders). All the participants were assigned a subject number on a form, and instructed to write their name on it, in order to secure later payment. The first name of the sender was written on the message to the receiver to inform the receiver about the gender of the sender. To protect the participants' privacy, the form with their number and name was returned to them with their payment. This was done after their gender and number had been registered but before other data was merged with this information.

### 3. Results

In total, 84 male and 100 female senders participated in the experiment; 81 of 184 (44.0%) sent a deceptive message compared to 57% in Childs (2012), 47% in Dreber and Johannesson (2008), 44% in Sutter (2009), 33–49% in Aoki et al. (2010), and 36% in Gneezy (2005).

As can be seen in Fig. 1, 45.2% of male senders lied to secure monetary benefits compared to 43.0% of female senders. Unlike Dreber and Johannesson (2008), but like Childs (2012), the gender difference in deception was not statistically significant ( $\chi^2(1, 184) = 0.09, p = 0.761$ ).

Most receivers were trusting, with 77.7% of the receivers following the recommendation from the sender. There was no gender difference in trust ( $\chi^2(1, 184) = 0.14, p = 0.706$ ). 65 of 85 men (76.5%) followed the recommendation, while 78 of 99 women (78.8%) trusted their messages. This is quite close to what other studies have found: 78% in Gneezy (2005), 76% in Dreber and Johannesson (2008), and 73% in Childs (2012).

### 4. Discussion

The goal of this study was to try to gauge Childs' (2012) reasons for the conflicting results between his experiment and Dreber and Johannesson's (2008) experiment, where men were more likely than women to lie in Dreber and Johannesson's experiment, but equally as likely in Childs' experiment.

Childs (2012) identifies two things that could explain Dreber and Johannesson's (2008) gender differences in lying. First, that there is an interaction between gender and monetary gains when it comes to lying, that women may have a greater aversion to

lying than men for smaller rather than larger monetary gains. Similar to Childs' results, there was no gender difference in lying in this experiment. However, the monetary gain for lying in this experiment (\$0.86) was lower than in Dreber and Johannesson's experiment (\$1.25), which suggests that women may not have a greater aversion to lying than men for monetary gains as Childs considers.

Childs' (2012) second point was that the gender difference could be culture specific. The Icelandic culture is similar to that of other Scandinavian countries, including Sweden. Both countries score low on Hofstede's Masculinity/Femininity (MAS) dimension, compared to Canada, indicating greater equality between the genders, with strong emphasis on social values (Singh et al., 2005; Vaiman et al., 2010). It is, therefore, not unreasonable to assume that if culture played a part in the different results between Dreber and Johannesson (2008) and Childs, the same gender differences should emerge in Iceland. It does not.

It appears that something else, apart from culture or women's aversion to lying for small monetary gains, may explain Dreber and Johannesson's (2008) and Childs' (2012) different results. One possible explanation could be the participants used in the two experiments. Different samples of participants, with different personality traits, can explain different research findings (Van Lange et al., 2011). Personality can affect the decisions that individuals make (Ben-Ner et al., 2004; Boone et al., 1999; Cobb-Clark and Schurer, 2012), and some trait variables, such as locus of control, are able to predict unethical behaviour (Street and Street, 2006). With this in mind, future research on gender differences in lying behaviour should include some form of a measure of personality traits to see a fuller picture of the uncertain difference.

### References

- Anderson, L.R., DiTraglia, F.J., Gerlach, J.R., 2011. Measuring altruism in a public goods experiment: a comparison of US and Czech subjects. *Experimental Economics* 14, 426–437.
- Aoki, K., Akai, K., Onoshiro, K., 2010. Deception and confession: experimental evidence from a deception game in Japan. Discussion Paper No. 786. Osaka: The Institute of Social and Economic Research, Osaka University. Retrieved September 26th 2012 from [www.iser.osaka-u.ac.jp/library/dp/2010/DP0786.pdf](http://www.iser.osaka-u.ac.jp/library/dp/2010/DP0786.pdf).
- Ben-Ner, A., Kong, F., Putterman, L., 2004. Share and share alike? gender-pairing, personality, and cognitive ability as determinants of giving. *Journal of Economic Psychology* 25, 581–589.
- Boone, C., De Brabander, B., van Witteloostuijn, A., 1999. The impact of personality on behavior in five prisoner's dilemma games. *Journal of Economic Psychology* 20, 343–377.
- Camerer, C.F., 2001. *Behavioral Economics*. Princeton University Press, Princeton, NJ.
- Charness, G., Gneezy, U., 2008. What's in a name? anonymity and social distance in dictator and ultimatum games. *Journal of Economic Behavior and Organization* 68, 29–35.
- Childs, J., 2012. Gender differences in lying. *Economics Letters* 114, 147–149.
- Cobb-Clark, D.A., Schurer, S., 2012. The stability of big-five personality traits. *Economics Letters* 115, 11–15.

- Croson, R., Gneezy, U., 2009. Gender differences in preferences. *Journal of Economic Literature* 47, 448–474.
- Dreber, A., Johannesson, M., 2008. Gender differences in deception. *Economics Letters* 99, 197–199.
- Fehr, E., Gächter, S., 2000. Fairness and retaliation: the economics of reciprocity. *The Journal of Economic Perspectives* 14, 159–181.
- Gneezy, U., 2005. Deception: the role of consequences. *American Economic Review* 95, 384–394.
- Henrich, J., Boyd, R., Bowles, S., Camerer, C., Fehr, E., Gintis, H., McElreath, R., 2001. In search of homo economicus: behavioral experiments in 15 small-scale societies. *American Economic Review* 91, 73–78.
- Roth, A.E., Prasnikar, V., Okuno-Fujiwara, M., Zamir, S., 1991. Bargaining and market behavior in Jerusalem, Ljubljana, Pittsburgh, and Tokyo: an experimental study. *American Economic Review* 81, 1068–1095.
- Singh, J., Carasco, E., Svensson, G., Wood, G., Callaghan, M., 2005. A comparative study of the contents of corporate codes of ethics in Australia, Canada and Sweden. *Journal of World Business* 40, 91–109.
- Street, M., Street, V.L., 2006. The effects of escalating commitment on ethical decision-making. *Journal of Business Ethics* 64, 343–356.
- Sutter, M., 2009. Deception through telling the truth?! experimental evidence from individuals and teams. *The Economic Journal* 119, 47–60.
- Vaiman, V., Sigurjonsson, T.O., Davidsson, P.Á., 2010. Weak business culture as an antecedent of economic crisis: the case of Iceland. *Journal of Business Ethics* 98, 67–83.
- Van Lange, P.A.M., Schipper, M., Balliet, D., 2011. Who volunteers in psychology experiments? an empirical review of prosocial motivation in volunteering. *Personality and Individual Differences* 51, 279–284.



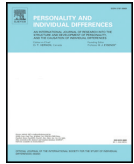
### **3.2 Paper II: Personality in Gneezy's cheap talk game: The interaction between Honesty-Humility and Extraversion in predicting deceptive behavior**





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# Personality and Individual Differences

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## Personality in Gneezy's cheap talk game: The interaction between Honesty-Humility and Extraversion in predicting deceptive behavior



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Recent papers have suggested that personality traits may predict behavior in cheap talk games. This paper investigated whether Honesty-Humility predicts dishonesty and whether Extraversion moderates the relationship between Honesty-Humility and dishonesty – all as measured by senders' behaviors in a cheap talk game. We hypothesized that the correlation between Honesty-Humility and dishonesty would be stronger among those who measure high for Extraversion than among those who measure low for Extraversion. One hundred and forty-three undergraduate students participated as senders in the study. Although Honesty-Humility did not correlate significantly with dishonest behavior, the results supported the hypothesis that Honesty-Humility interacted with Extraversion to predict dishonest behavior. The results suggest that the effects of a personality trait may depend upon other traits.

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### 1. Introduction

The theoretical assumption that individuals are entirely self-interested (Fehr & Gächter, 2000) is on the defensive, with evidence of people preferring not to maximize their own gains when able to do so (Charness & Gneezy, 2008). In recent economic studies, the focus on why some individuals prefer not to lie in response to economic incentives has been trained on their personal characteristics (Childs, 2012, 2013; Dreber & Johannesson, 2008; Gylfason, Arnardottir, & Kristinsson, 2013; Muehlheusser, Roider, & Wallmeier, 2015), as opposed to personality characteristics emphasized in personality research (Hilbig & Zettler, 2015).

Personality can affect the decisions that individuals make (Ben-Ner, Kong, & Putterman, 2004; Boone et al., 1999; Cobb-Clark and Schurer, 2012; Lönnqvist, Verkasalo, & Walkowitz, 2011), and some trait variables have been shown to predict unethical behavior, such as the Locus of Control (Street and Street, 2006) and Honesty-Humility (Lee, Ashton, & Shin, 2005). Many researchers agree that the “Big Five” personality traits that are used in the five-factor model – Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to

experience – offer a comprehensive and efficient method of organizing personality dimensions (e.g., McCrae & Costa, 1997), and it has been argued that this five-factor personality model should account for most of the individual variations in behavior observed empirically (Paunonen, 2003). However, recent work has indicated that including a sixth factor may be warranted (Lee & Ashton, 2004). This sixth factor is highly relevant for the present paper as it captures “Honesty-Humility” and has been found to be correlated with behavior related to integrity (e.g., Hilbig, Moshage, and Zettler, 2015; Lee, Ashton, Morrison, Cordery, & Dunlop, 2008). This Honesty-Humility factor is thought to represent “the tendency to be fair and genuine in dealing with others, in the sense of cooperating with others even when one might exploit them without suffering retaliation” (Ashton, Lee, & Goldberg, 2007, p. 156) and has been strongly correlated with the traits of Machiavellianism, Narcissism, and psychopathy (Lee & Ashton, 2005). Lee and Ashton (2004) reported that the Honesty-Humility factor might explain various exploitative and deceptive behaviors. In particular, it can predict workplace delinquency and scores on overt integrity tests (Lee, Ashton, & de Vries, 2005), workplace anti-social behavior (Lee, Ashton, & Shin, 2005), ethical decision-making tasks (Lee et al., 2008), counterproductive behaviors in work and academic settings (Marcus et al., 2007; Zettler & Hilbig, 2010), behaviors in the dictator game (Hilbig & Zettler, 2009), and behaviors in a public goods game in which individuals have no fear of retaliation (Hilbig, Zettler, & Heydasch, 2012).

In a recent paper, Hilbig and Zettler (2015) took on the task of bridging the gap between deceitful behavior and personality research, and

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thus pressed others to carry on with the work. Hilbig and Zettler (2015) based their research on, among other, Hershfield, Cohen, and Thompson (2012) explaining that their study was, at that time, the only study to correlate Honesty-Humility with actual dishonest behavior contrary to self- and observer-reported data. In one of their studies, Hershfield et al. (2012) used a modified version of Gneezy's (2005) cheap talk game to detect an undisputable lie.<sup>1</sup> In a standard Gneezy's (2005) cheap talk game, the sender has the option of sending a deceptive message – a lie – to a receiver without any consequences or retaliation, a message typically interpreted as a dishonest message (Cohen, Gunia, Kim-Jun, & Murnighan, 2009; Fischbacher & Föllmi-Heusi, 2013; Gibson, Tanner, & Wagner, 2013; Hershfield et al., 2012; Mazar & Ariely, 2006).

Individuals scoring low on Honesty-Humility are willing to obtain economic gains by cheating or stealing to manipulate and flatter others or by pretending to like them (Ashton et al., 2007). In the context of Gneezy's cheap talk game, this behavior suggests that senders with low levels of Honesty-Humility are more likely to act in their own interests at the expense of the receiver because they do not fear retaliation (Hilbig et al., 2012); therefore, Honesty-Humility should have a negative relationship with the tendency to send a deceptive message (Oh, Lee, Ashton, & de Vries, 2011).

The primary focus of Hershfield et al. (2012) study was not to use personality traits as predictors of dishonest behavior, which explains why they did not correlate Honesty-Humility with the outcome of the modified Gneezy's (2005) cheap talk game. Nonetheless, Hilbig, Zettler and associates have extensively explored how the main effects of Honesty-Humility predict unethical decision making and behavior (e.g. Hilbig & Zettler, 2015; Hilbig, Glöckner, & Zettler, 2014; Hilbig et al., 2012; Hilbig, Zettler, Leist, & Heydasch, 2013). However, Witt, Burke, Barrick, and Mount (2002) have suggested that the effect of a personality trait may well depend upon the presence and levels of other traits, particularly when the traits correspond with the demands of the behavior under investigation – in this case, dishonesty. Previous research has also shown that interactive effects among personality traits can greatly improve predictions regarding behavior (Judge and Erez, 2007; Oh et al., 2011; Witt, 2002). For example, Oh et al. (2011) found that in multiple samples, Extraversion strengthened the relationship between low Honesty-Humility and workplace deviance. Extraversion refers to those individual characteristics that lead to describing someone as sociable, energetic, assertive, talkative, socially confident, active, cheerful, excitement-seeking, and less inhibited by conformity pressures (Costa & McCrae, 1992; Hampson, 2012; LePine and Van Dyne, 2001). Therefore, Extraversion may play a role in determining the relationship between Honesty-Humility and deceptive behavior in Gneezy's (2005) cheap talk game, following Oh et al. (2011), who argued that it seemed "... plausible that dishonest, selfish, and greedy individuals (those with low Honesty-Humility) are more harmful and deviant when they are extraverts rather than introverts because they generally have high levels of social boldness (risk taking) and social skills needed to initiate deviant behaviors [...] and to escape punishment or embarrassment when caught as long as the deviant behavior in question is neither illegal nor serious." (p. 503).

Thus, it is logical to assume that Honesty-Humility should be correlated with the behavior of senders in Gneezy's (2005) cheap talk game. We hypothesize that senders with low (as opposed to high) Honesty-Humility are more likely to send a deceptive message. Furthermore, and more importantly, following Oh et al. (2011) and in addition to Hilbig and Zettler (2015), we hypothesize that in Gneezy's cheap talk game, senders with low (as opposed to high) Honesty-Humility are more likely to send a deceptive message when they also measure high (as opposed to low) for Extraversion.

## 2. Method

### 2.1. Measures

#### 2.1.1. Gneezy's cheap talk game

A design similar to that used in Gneezy (2005) was used in this study. Two players, the sender and the receiver, play a single game anonymously. The sender is asked to send the receiver either of two messages: "Option A will earn you more money than option B" or "Option B will earn you more money than option A". Only the sender is informed of the monetary payoff associated with each option ("Option A: ISK 500 to you and ISK 1,000 to the other student" or "Option B: ISK 1,000 to you and ISK 500 to the other student"), but the receiver must choose between options A and B based exclusively on the message he receives. One of the messages is unmistakably false and therefore the sender has to decide whether to send a false message that will benefit him financially if it is believed. However the receiver will have to base his decision only on the message sent to him. The two options, therefore, result in different payoffs for both players, but the receiver's choice alone decides the payment for both players. For example, if the receiver chooses option A, the receiver earns more than the sender. However, if the receiver chooses option B, the receiver earns less than the sender. Receivers were able to choose only between options A and B without knowing the monetary payoff of either. For half of the participants, if option A was selected, the sender was paid ISK 1000 (approximately US \$7.50) and the receiver ISK 500; if option B was selected, the sender was paid ISK 500 and the receiver ISK 1000. For the other half of the participants, the payoffs were reversed. The game was a one-time interaction between the sender and receiver, and each participant played the game once.

#### 2.1.2. Personality

The Big Five personality traits (Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness) were captured using the Icelandic version of the 60-item NEO-FFI personality inventory (Costa & McCrae, 1992).

Honesty-Humility was captured using part of the Icelandic version of the IPIP-HEXACO personality inventory (Ashton, Lee, and Goldberg, 2007). The IPIP-HEXACO inventory has been shown to have good psychometric properties with regard to factor structure, internal reliability, and both convergent and discriminant validity (Ashton, Lee, and Goldberg, 2007). The full inventory consists of 240 items that measure 6 broad personality traits (Honesty-Humility, Emotionality, eXtraversion, Agreeableness, Conscientiousness, and Openness); however, only the 40 items measuring Honesty-Humility were administered in the present study.

### 2.2. Participants and procedure

Two hundred and eighty six undergraduate students participated in the study (143 senders and 143 receivers). Of the 143 senders (aged 19–50,  $M = 23.2$ ,  $SD = 4.2$ ), 68 were female.

After providing consent, the participants were asked to play Gneezy's (2005) cheap talk game. After playing the game, the senders responded to the NEO-FFI and the Honesty-Humility scale. After pairing senders and receivers, all participants were paid whatever they had earned in the game.

## 3. Results

In total, 36% of the senders sent a deceptive message. The internal-consistency reliabilities (Cronbach's alpha) for all the personality scales were moderate (Openness to experience) to high (Honesty-Humility) (Table 1). The inter-correlations (Person's  $r$ ) among the five NEO-FFI personality scales were fairly low, indicating the independence of those constructs. The high correlation between the Honesty-Humility

<sup>1</sup> Hershfield et al. (2012) employed a certainty procedure (Cohen et al., 2009) and informed senders on how their receiver had already decided to act (the receivers act first opposed to in the standard game where senders act first), thereby eliminating the uncertainty about the receiver's response.

**Table 1**  
Means (standard deviations in parentheses) and intercorrelations between the outcome of Gneezy's cheap talk game (1 = lied, 0 = told the truth) and the six personality traits (n = 143).

		M	(SD)	Correlations							
				1	2	3	4	5	6	7	
1.	Lied in Gneezy's CTG	.36	(.48)	–							
2.	Neuroticism	2.53	(.68)	.00	.85						
3.	Extraversion	3.70	(.47)	.21*	–.28**	.78					
4.	Openness to experience	3.10	(.54)	.01	–.18*	.11	.75				
5.	Agreeableness	3.77	(.51)	–.18*	–.29**	.13	.02	.78			
6.	Conscientiousness	3.77	(.61)	–.01	–.26**	.35**	.11	.14	.88		
7.	Honesty-Humility	3.46	(.42)	–.13	–.10	–.05	–.02	.61**	.19*	.89	

Note: Internal consistency reliabilities (Cronbach's alpha) are given on the diagonal.  
CTG = cheap talk game.

\*  $p < .05$ ; \*\*  $p < .01$  (all two-tailed).

scale and Agreeableness (.61) was expected considering that in the NEO-FFI, Agreeableness contains items that are closely related to Honesty-Humility (Ashton & Lee, 2005; Lee & Ashton, 2004). Nonetheless, Honesty-Humility did not correlate significantly with deceptive behavior.

A binary logistic regression was used to determine whether Extraversion strengthened the relationship between low Honesty-Humility and sending a deceptive message. Table 2 shows the results of this binary logistic regression, in which sending a deceptive message was regressed on Honesty-Humility, Extraversion and their interaction term (the personality variables were standardized to aid interpretation). The independent variables were entered simultaneously after having ascertained that the assumption of multicollinearity was not violated. If the interaction between Honesty-Humility and Extraversion is statistically significant, it can be concluded that the relationship between Honesty-Humility and deception will be stronger for those measuring high for Extraversion than for those measuring low for Extraversion. The association between Honesty-Humility and sending a deceptive message approached significance, and the interaction term for Honesty-Humility and Extraversion produced a significant increase that was in addition to the other two variables ( $\chi^2(1, 143) = 4.54, p < .05$ ). The pattern of interaction effects between Honesty-Humility and Extraversion is shown in Fig. 1, which demonstrates that for those who score high for Honesty-Humility, it is irrelevant whether they measured high or low for Extraversion with respect to their odds of sending a deceptive message.

Furthermore, we computed correlations for subsamples of senders who were high ( $z \geq 0$ ) or low ( $z < 0$ ) on Extraversion. The correlation coefficients were  $-.35$  ( $p < .01$ ) for high Extraversion and  $.10$  ( $p > .05$ ) for low Extraversion, providing additional support for the hypothesis that the correlation between honesty-humility and sending a deceptive message is higher for those measuring high (as opposed to low) in Extraversion ( $p < .01$ ).

#### 4. Discussion

The ability to tell honest and dishonest people apart is valuable in both economic and social settings (Rosenbaum, Billinger, and Stieglitz, 2014). Previous research has shown that three of the six personality traits in Table 1, Agreeableness (Williams, Nathanson, & Paulhus, 2010), Conscientiousness (Hogan & Hogan, 1989; Horn

et al., 2004; Williams et al., 2010) and Honesty-Humility (Lee & Ashton, 2004), correlate with deceptive or dishonest behavior. The other three, Neuroticism, Openness to experience and Extraversion, were not necessarily believed to be related to dishonest behavior, although the excitement-seeking component of Extraversion has been weakly correlated with antisocial behavior (Jones, Miller, & Lynam, 2011). In our study, deceptive behavior correlated significantly with Agreeableness and Extraversion but did not correlate with either Conscientiousness or Honesty-Humility. Thus, we did not find support for our hypothesis that senders with low (as opposed to high) Honesty-Humility were more likely to send a deceptive message. In contrast to our results, Hilbig and Zettler (2015) and Hilbig et al. (2012) found a moderate association between Honesty-Humility and lying on the one hand, and the contribution in a public goods game on the other, in situations that was similar to our game in that participants did not fear retaliation.<sup>2</sup>

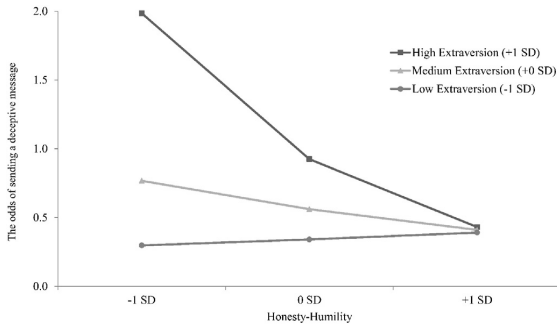
Conversely, in line with previous research (Oh et al., 2011), the results confirmed the hypothesis that Honesty-Humility interacted with Extraversion in predicting deceptive behavior in Gneezy's (2005) cheap talk game. More specifically, the various correlations in our subsamples showed that individuals measuring high for Extraversion showed a more moderate correlation between Honesty-Humility and deceptive behavior compared with a non-significant correlation for individuals measuring low on Extraversion. Nonetheless, Honesty-Humility did not independently predict deceptive behavior as it predicted lying (Hilbig & Zettler, 2015), workplace deviance (Oh et al., 2011), behavior in a public goods game (Hilbig et al., 2012), or behavior in the dictator game (Hilbig & Zettler, 2009). In fact, our results directly contradict those from Oh et al. (2011) and Hilbig et al. (2012), where Honesty-Humility was found to be a significant predictor of dishonest and free-riding behavior while Extraversion did not predict such behavior.

Our results, in which 36% of senders sent a deceptive message, mirror those of Gneezy (2005) and indicate that the non-significant correlation between Honesty-Humility and deceptive behavior is not due to atypical results in the game. Nonetheless, the lack of meaningful association between Honesty-Humility and deceptive behavior is somewhat concerning because previous research has described correlations between Honesty-Humility and various exploitative and deceptive behaviors (e.g., Hilbig & Zettler, 2009; Hilbig & Zettler, 2015; Lee & Ashton,

**Table 2**  
Binary logistic regression results for the interaction effects between Honesty-Humility and Extraversion in predicting the sending of a deceptive message.

Variable	B	SE B	p-Value (two tailed)	Nagelkerke R <sup>2</sup>
Honesty-Humility	–.31	.19	$p = .10$	.125
Extraversion	.50	.20	$p = .01$	
Interaction	–.45	.22	$p = .04$	
Constant	–.58	.18	$p < .01$	

<sup>2</sup> The non-significant correlation seems particularly relevant to the overall interpretation of the results. Using the correlation coefficients from Hilbig et al. (2012) between Honesty-Humility and the contribution in a public goods game,  $r = .33$  and  $r = .25$ , we conducted a power analysis using GPower (Faul, Erdfelder, Buchner, & Lang, 2009). Power (1- $\beta$ ) was set at 0.80 and  $\alpha = .05$  (one-tailed). The results were that a sample of 55 and 97 participants, respectively, would have been required. We also conducted a post hoc power analysis in GPower, where power was set at 0.80,  $\alpha = .05$  (one-tailed) with  $r = .13$ . The results were that the sample size would have to increase to 364 participants. Therefore, it is possible that our non-significant correlation can be attributed to a limited sample size.



**Fig. 1.** The interaction effects between Honesty-Humility and Extraversion on sending a deceptive message. High Extraversion is indicated by one standard deviation (+1 SD) above the mean (0). Low Honesty-Humility is indicated by one standard deviation (–1 SD) below the mean.

2004; Marcus et al., 2007). That alone might not be so concerning, but the lack of association between deceptive behavior and Conscientiousness adds to this concern, as previous research has shown that traits related to Conscientiousness are correlated in persistent patterns with dishonest behaviors (Hogan & Hogan, 1989; Horn et al., 2004; Williams et al., 2010).

The role of Extraversion in social decision-making contexts is somewhat ambiguous (Zhao & Smillie, 2015), given that it is formed from opposing agentic and affiliative motivational components (Depue & Collings, 1999). Affiliative Extraversion is related to warmth and affection and is believed to be related conceptually to Agreeableness, whereas agentic Extraversion is related to assertiveness and dominance (Zhao & Smillie, 2015). Neither type of Extraversion is clearly related to dishonesty, but according to Zhao and Smillie (2015), agentic Extraversion in economic games such as Gneezy's (2005) cheap talk game "... would be expected to drive the pursuit of personal reward, encouraging behaviors such as defection and free riding, as well as selfish division of wealth." (p. 281). This study found no significant correlation between Extraversion and Agreeableness (Table 1), which indicates the independence of those constructs (Lee & Ashton, 2004) and leaves the assertiveness (Zhao & Smillie, 2015) and perhaps the excitement-seeking components of Extraversion (Jones et al., 2011) as possible explanations for its correlation with deceptive behavior.

One of the strengths of Gneezy's (2005) cheap talk game is that the receiver bears the full cost of the sender's behavior. The sender is not playing against the experimenter nor a group of people he might inflict some social cost on (Hilbig & Zettler, 2015). However, in order to pair all senders and receivers, information is needed on who the senders are. And although they are assured full confidentiality, they might feel apprehensive about incriminating themselves (since recommending receivers-an option that earns them less money-is an identifiable lie). The fact that a behavior is self-incriminating could awake social desirability concerns and influence senders' behavior (Hilbig & Zettler, 2015). Lying without full anonymity may therefore have something to do with audacity or social boldness, one facet of Extraversion (Zhao & Smillie, 2015). In fact, Extraversion correlated equally high, if not higher, with lying as Honesty-Humility did in Hilbig and Zettler (2015) experiment 2. The situations in experiment 2 is similar to Gneezy's (2005), as participants had to check one of two answer options in a throw of dice and return (send) it to the experimenter. One of the answer option "Yes, I rolled the target number. I will therefore additionally gain €5.00" (p. 76) was more likely to be a lie than the truth, comparable to Gneezy's (2005) option of recommending receivers the option that earned them less money.

This is the first time deception has been used in the study of the association between Honesty-Humility and lying, where senders play against an actual and specific adversary. However, to the best of our knowledge, the validity of Gneezy's cheap talk game (2005) as a

measure of dishonesty has never been verified. In addition, Sutter (2009) has proposed that even telling the truth should count as an act of deception when the sender expects the receiver not to follow the sender's message (Gneezy, Rockenbach, & Serra-Garcia, 2013), making it difficult to interpret senders' behaviors without further evidence. There is also the possibility that the sender is simply acting as a shrewd competitor in a game whose objective is personal reward. Based on the lack of correlation between the behavior of senders and the Honesty-Humility scale, which is a valid and reliable instrument (Ashton & Lee, 2005), we must question whether it is possible to describe all senders that send a deceptive message in Gneezy's (2005) cheap talk game as dishonest. Therefore, it is recommended that future research that focuses on the motives and expectations of the senders in Gneezy's (2005) cheap talk game investigate whether such behavior can be described as dishonest.

## References

- Ashton, M. C., & Lee, K. (2005). Honesty-Humility, the big five, and the five-factor model. *Journal of Personality, 73*, 1321–1353.
- Ashton, M. C., Lee, K., & Goldberg, L. R. (2007). The IPIP-HEXACO scales: An alternative, public-domain measure of the personality constructs in the HEXACO model. *Personality and Individual Differences, 42*, 1515–1526.
- Ben-Ner, A., Kong, F., & Putterman, L. (2004). Share and share alike? Gender-pairing, personality, and cognitive ability as determinants of giving. *Journal of Economic Psychology, 25*, 581–589.
- Boone, C., De Brabander, B., & van Witteloostuijn, A. (1999). The impact of personality on behavior in five Prisoners's Dilemma games. *Journal of Economic Psychology, 20*, 343–377.
- Charness, G., & Gneezy, U. (2008). What's in a name? Anonymity and social distance in dictator and ultimatum games. *Journal of Economic Behavior and Organization, 68*, 29–35.
- Childs, J. (2012). Gender differences in lying. *Economics Letters, 114*, 147–149.
- Childs, J. (2013). Personal characteristics and lying: An experimental investigation. *Economics Letters, 121*, 425–427.
- Cobb-Clark, D. A., & Schurer, S. (2012). The stability of big-five personality traits. *Economics Letters, 115*, 11–15.
- Cohen, T. R., Gunia, B. C., Kim-Jun, S. Y., & Murnighan, J. K. (2009). Do groups lie more than individuals? Honesty and deception as a function of strategic self-interest. *Journal of Experimental Social Psychology, 45*, 1321–1324.
- Costa, P. T., & McCrae, R. R. (1992). *Revised NEO personality inventory (NEO PI-R) and NEO Five-Factor Inventory (NEO-FFI) professional manual*. Odessa, FL: Psychological Assessment Resources.
- Depue, R. A., & Collings, P. F. (1999). Neurobiology of the structure of personality: Dopamine, facilitation of incentive motivation, and extraversion. *Behavioral and Brain Sciences, 22*(3), 491–569.
- Dreber, A., & Johannesson, M. (2008). Gender differences in deception. *Economics Letters, 99*, 197–199.
- Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G\*Power 3.1: Test for correlation and regression analyses. *Behavior Research Methods, 41*, 1149–1160.
- Fehr, E., & Gächter, S. (2000). Fairness and retaliation: The economics of reciprocity. *The Journal of Economic Perspectives, 14*, 159–181.
- Fischbacher, U., & Föllmi-Heusi, F. (2013). Lies in disguise – An experimental study on cheating. *Journal of the European Economic Association, 11*, 525–547.
- Gibson, R., Tanner, C., & Wagner, A. F. (2013). Preferences for truthfulness: Heterogeneity among and within individuals. *American Economic Review, 103*, 532–548.
- Gneezy, U. (2005). Deception: The role of consequences. *American Economic Review, 95*, 384–394.
- Gneezy, U., Rockenbach, B., & Serra-Garcia, M. (2013). Measuring lying aversion. *Journal of Economic Behavior & Organization, 93*, 293–300.
- Gylfason, H. F., Amardottir, A. A., & Kristinsson, K. (2013). More on gender differences in lying. *Economics Letters, 119*, 94–96.
- Hampson, S. E. (2012). Personality processes: Mechanisms by which personality traits "get outside the skin". *Annual Review of Psychology, 63*, 315–339.
- Hershfield, H. E., Cohen, T. R., & Thompson, L. (2012). Short horizons and tempting situations: Lack of continuity to our future selves leads to unethical decision making and behavior. *Organizational Behavior and Human Decision Processes, 117*, 298–310.
- Hilbig, B. E., & Zettler, I. (2009). Pillars of cooperation: Honesty-Humility, social value orientations, and economic behavior. *Journal of Research in Personality, 43*, 516–519.
- Hilbig, B. E., & Zettler, I. (2015). When the cat's away, some mice will play: A basic trait account of dishonest behavior. *Journal of Research in Personality, 57*, 72–88.
- Hilbig, B. E., Zettler, I., & Heydasch, T. (2012). Personality, punishment and public goods: Strategic shifts towards cooperation as a matter of dispositional Honesty-Humility. *European Journal of Personality, 26*(3), 245–254.
- Hilbig, B. E., Zettler, I., Leist, F., & Heydasch, T. (2013). It takes two: Honesty-Humility and Agreeableness differentially predict active versus reactive cooperation. *Personality and Individual Differences, 54*, 598–603.
- Hilbig, B. E., Moshagen, M., & Zettler, I. (2015). Truth will out: Linking personality, morality, and honesty through indirect questioning. *Social Psychology and Personality Science, 6*, 140–147.

- Hilbig, B. F., Glöckner, A., & Zettler, I. (2014). Personality and prosocial behavior: Linking basic traits and social value orientations. *Journal of Personality and Social Psychology*, *107*, 529–539.
- Hogan, J., & Hogan, R. (1989). How to measure employee reliability. *Journal of Applied Psychology*, *74*, 273–279.
- Horn, J., Nelson, C. E., & Brannick, M. (2004). Integrity, conscientiousness, and honesty. *Psychological Reports*, *95*, 27–38.
- Jones, S. E., Miller, J. D., & Lynam, D. R. (2011). Personality, antisocial behavior, and aggression: A meta-analytic review. *Journal of Criminal Justice*, *39*, 329–337.
- Judge, T. A., & Erez, A. (2007). Interaction and intersection: The constellation of Emotional Stability and Extraversion in predicting performance. *Personnel Psychology*, *60*, 573–596.
- Lee, K., & Ashton, M. C. (2004). Psychometric properties of the HEXACO personality inventory. *Multivariate Behavioral Research*, *39*, 329–358.
- Lee, K., & Ashton, M. C. (2005). Psychopathy, Machiavellianism, and narcissism in the five-factor model and the HEXACO model of personality structure. *Personality and Individual Differences*, *38*, 1571–1582.
- Lee, K., Ashton, M. C., Morrison, D. L., Cordery, D., & Dunlop, P. D. (2008). Predicting integrity with the HEXACO personality model: Use of self- and observer reports. *Journal of Occupational and Organizational Psychology*, *81*, 147–167.
- Lee, K., Ashton, M. C., & de Vries, R. E. (2005a). Predicting workplace delinquency and integrity with the HEXACO and five-factor models of personality structure. *Human Performance*, *18*, 179–197.
- Lee, K., Ashton, M. C., & Shin, K. -H. (2005b). Personality correlates of workplace antisocial behavior. *Applied Psychology: An international review*, *54*, 81–98.
- LePine, J. A., & Van Dyne, L. (2001). Voice and cooperative behavior as contrasting forms of contextual performance: Evidence of differential relationships with big five personality characteristics and cognitive ability. *Journal of Applied Psychology*, *86*, 326–336.
- Lönnqvist, J. -E., Verkasalo, M., & Walkowitz, G. (2011). It pays to pay: Big five personality influences on co-operative behavior in an incentivized and hypothetical prisoner's dilemma game. *Personality and Individual Differences*, *50*(2), 300–304.
- Marcus, B., Lee, K., & Ashton, M. C. (2007). Personality dimensions explaining relationships between integrity tests and counterproductive behavior: Big five or one in addition? *Personnel Psychology*, *60*, 1–34.
- Mazar, N., & Ariely, D. (2006). Dishonesty in everyday life and its policy implications. *Journal of Public Policy & Marketing*, *25*, 117–126.
- McCrae, R. R., & Costa, P. T. (1997). Personality trait structure as a human universal. *American Psychologist*, *52*(5), 509–516.
- Muehlheusser, G., Roider, A., & Wallmeier, N. (2015). Gender differences in honesty: Group versus individuals. *Economics Letters*, *128*, 25–29.
- Oh, I. -S., Lee, K., Ashton, M. C., & de Vries, R. E. (2011). Are dishonest extraverts more harmful than dishonest introverts? The interaction effects of Honesty-Humility and extraversion in predicting workplace deviance. *Applied Psychology: An international review*, *60*, 496–516.
- Paunonen, S. V. (2003). Big five factors of personality and replicated predictions of behavior. *Journal of Personality and Social Psychology*, *84*, 411–424.
- Rosenbaum, S. M., Billinger, S., & Stieglitz, N. (2014). Let's be honest: A review of experimental evidence of honesty and truth-telling. *Journal of Economic Psychology*, *45*, 181–196.
- Street, M., & Street, V. L. (2006). The effects of escalating commitment on ethical decision-making. *Journal of Business Ethics*, *64*, 343–356.
- Sutter, M. (2009). Deception through telling the truth?! Experimental evidence from individuals and teams. *The Economic Journal*, *119*, 47–60.
- Williams, K. M., Nathanson, C., & Paulhus, D. L. (2010). Identifying and profiling scholastic cheaters: Their personality, cognitive ability, and motivation. *Journal of Experimental Psychology: Applied*, *16*, 293–307.
- Witt, L. A. (2002). The interactive effects of extraversion and conscientiousness on performance. *Journal of Management*, *28*(6), 835–851.
- Witt, L. A., Burke, L. A., Barrick, M. R., & Mount, M. K. (2002). The interactive effects of conscientiousness and agreeableness on job performance. *Journal of Applied Psychology*, *87*(1), 164–169.
- Zettler, I., & Hilbig, B. E. (2010). Honesty-Humility and a person-situation interaction at work. *European Journal of Personality*, *24*, 569–582.
- Zhao, K., & Smillie, L. D. (2015). The role of interpersonal traits in social decision making: Exploring sources of behavioral heterogeneity in economic games. *Personality and Social Psychology Review*, *19*(3), 277–302.



### **3.3 Paper III: Gender differences in lying: The role of stakes**





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## Gender differences in lying: The role of stakes

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## ABSTRACT

Using an amended Gneezy's cheap-talk game with multiple decisions, we test whether gender differences in lying depend on the magnitude of gains, as hypothesized in the literature. We find that women may have a greater aversion to lying for small monetary gains; this effect disappears with increased gains.

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## 1. Introduction

Deviations from the theoretical assumption that people are entirely self-interested are ample (e.g. Fehr and Gächter, 2000; Fehr et al., 2002). For example, a substantial proportion of people prefer not to lie, even when lying might lead to higher payoffs and there are no consequences or retaliation (Gneezy, 2005). Nevertheless, women have been found to offer more than men in dictator games and public-good games (Eckel and Grossman, 1998). Perhaps more relevant for this study, women have generally been

found to be more trustworthy than men (e.g. Abeler et al., 2019; Buchan et al., 2008; Dreber and Johannesson, 2008; Grosch and Rau, 2017; Kleinknecht, 2019). However, this observation is not without exceptions (e.g. Charness et al., 2019; Childs, 2012; Ezquerro et al., 2018; Gylfason et al., 2013; Vranceanu and Dubart, 2019).

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found to be more trustworthy than men (e.g. Abeler et al., 2019; Buchan et al., 2008; Dreber and Johannesson, 2008; Grosch and Rau, 2017; Kleinknecht, 2019). However, this observation is not without exceptions (e.g. Charness et al., 2019; Childs, 2012; Ezquerro et al., 2018; Gylfason et al., 2013; Vranceanu and Dubart, 2019).

Given these mixed findings, Kleinknecht (2019) suggests that gender differences in lying might be contextual and Erat and Gneezy (2012) conclude that "women are less likely to lie when it is costly to the other side". (p. 723). If women are less likely than men to lie when it is costly to their opponents, the same might hold true for increased payoff to themselves and decreased payoff to their opponents (see Gneezy (2005) for e.g. relevance for contract theory). Additionally, Childs (2012) hypothesized that women have a greater aversion to lying for small monetary gains that disappears with increased gain.

We investigate the relationship between women's inclination to lie and stakes, using an amended version of Gneezy's (2005) cheap-talk game. Specifically, we use a within-subject design that includes multiple decisions per participant, with varying stakes. We find women to have a greater aversion to lying for small monetary gains that disappears when the stakes are raised.

## 2. Experimental design

The standard Gneezy's (2005) cheap-talk game has two anonymously paired players, a sender and a receiver. The receiver chooses between two options, A and B, that determine payoffs for both players. Only the sender knows the payoffs related to A and B. Before the receiver decides the sender is asked to send the receiver either of two messages: "Option A will earn you more money than option B" or "Option B will earn you more money than option A".

In our implementation senders were undergraduate students and informed that they would be paired anonymously with a receiver recruited in one of Reykjavik's shopping centers; neither would know the identity of the other. We chose to have the receivers from a different subject pool, as complete strangers, to increase the likelihood of senders lying (Depaulo and Kashy, 1998). In the amended version of the game senders were shown a decision sheet which contained a menu of 10 decisions, numbered from 1 to 10 (see Appendix A). Each decision had two options A and B; the sender's own earnings from A were 500 ISK in all decisions, while her earnings from B varied from 600 to 5000 ISK (ISK 500  $\approx$  USD 4.40). For the receiver, the earnings were mirrored, that is, her earnings from A varied from 600 to 5000 ISK while her earnings from B are always 500. We measured the 'stakes' of a decision as the earnings difference between the sender and receiver. This varied from 100 ISK in the first decision to 4500 ISK in the tenth (if the receiver's favor for option A and the sender's favor for option B).

For each decision, senders choose one of the two messages described above to send to the receiver. Senders were informed that at the end of the experiment we would randomly draw a number between 1 and 10 and send the message chosen for that decision to an actual receiver, after which the receiver's choice would determine the payoff for both players.

We stressed to senders that only one of the ten decisions would count, but that they would not know which one. Therefore, they should treat each decision as if it were the only one that was going to count in the end. Following the receivers' decision, the senders were paid. To secure full anonymity for senders and still have full knowledge of every sender's behavior, senders used a private identification number made only available to them. One week later, after we had collected receivers' decisions, senders could use these id numbers to collect their earnings.

At the end of each session, senders provided demographic information and completed the Icelandic version of the 60-item HEXACO Personality Inventory-Revised (Ashton and Lee, 2009), where the answers ranged from 1 (totally disagree) to 5 (totally agree) and were averaged to create a summary measure, with satisfactory internal consistency (Cronbach's  $\alpha = .69$ ). This allows us to analyze whether senders' behavior can be attributed to individual personality attributes (Ellingsen and Johannesson, 2004). Specifically, we are interested whether the attribute Honesty-Humility predicts dishonest behavior (Ashton and Lee, 2005; for more about personality attributes and unethical behavior, see Lee et al., 2005) because in Gneezy's (2005) cheap-talk game, the behavior of senders has been interpreted as dishonest without empirical evidence (e.g., Capraro, 2018; Fischbacher and Föllmi-Heusi, 2013; Mazar and Ariely, 2006).

## 3. Results

51 male and 71 female senders participated in the study, and one who did not report their gender. As can be seen in Fig. 1, 53% of the male senders lied in an attempt to secure the preferred option when the stakes were lowest; the same holds

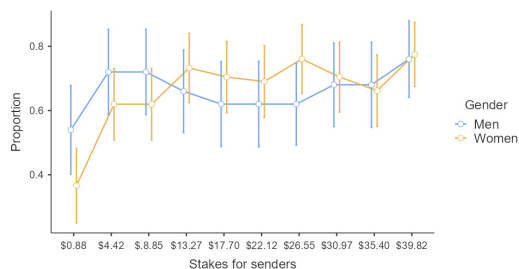


Fig. 1. Proportion of all senders lying with increased stakes. Error bars represent the 95% confidence interval.

for 37% of female senders.<sup>1</sup> We ran a repeated measures analysis of variance (ANOVA) and examined the interaction between the within-subjects factor stakes, with gender as the independent factor. A main effect for stakes was found,  $F(7.15, 858.25) = 6.44$ ,  $p < .001$ , indicating that senders were more likely to lie for larger stakes than smaller. Additionally, we found a significant stakes  $\times$  gender interaction,  $F(7.15, 858.25) = 2.29$ ,  $p = .025$ , with women appearing less likely than men to lie for smaller stakes, while the gender difference is not observed for higher stakes, supporting Childs' (2012) hypothesis.<sup>2</sup> It seems that the first decision is driving the gender difference,  $t(119) = 1.91$ ,  $p = .058$ , although we note that we are underpowered to detect small to modest differences.<sup>3</sup>

Gender did not correlate with 'number of lies', a summary measure of how often for the ten decisions senders sent a deceptive message,  $r_p = .005$ ,  $p = .96$ . The Honesty-Humility measure correlates with 'number of lies',  $r_p = -.336$ ,  $p < .001$ .

Majority of receivers were trusting, with 58% of the receivers following their sender's suggestion. This is lower than in previous studies, with 73%–78% of receivers following their sender's suggestion (e.g. Childs, 2012; Dreber and Johannesson, 2008; Gneezy, 2005; Gylfason and Olafsdottir, 2017), probably due to different settings (shoppers versus students).

## 4. Conclusion

Similar to previous studies on deception our results indicate that senders are more likely to lie for larger stakes than smaller (e.g., Dreber and Johannesson, 2008; Erat and Gneezy, 2012; Gneezy, 2005; Sutter, 2009; Leibbrandt et al., 2018). Kajackaitė and Gneezy (2017) summarize that for deception games "senders are more likely to lie when the incentives to do so are increased" (p. 434). Our results with respect to gender differences are in accordance with Childs' (2012) suggestion that women may have a greater aversion to lying than men do for small stakes, but that this difference disappears with increasing stakes. We consider this result a first step towards a better understanding of gender

<sup>1</sup> Sutter (2009) raises the point that telling the truth should count as an act of "sophisticated" deception when the sender anticipates that the receiver will not follow his message. This suggests that we might be underestimating the amount of deception in our sample.

<sup>2</sup> In Appendix B we report results of a probit regression of lying as a function of gender, stakes and its interaction. The coefficient of the interaction between stakes and gender is negative, supporting Childs' (2012) hypothesis, implying that women appear less likely than men to lie for smaller stakes.

<sup>3</sup> We have sufficient power to test for our main effects and interaction effects. A post hoc power analysis using GPower (Faul et al., 2009) with effect size at  $f = .14$ ,  $\alpha = .05$ , and total sample size as 122, gives us a power  $(1-\beta)$  of .99. However, we are not sufficiently powered to test for gender differences for all ten decisions. To test for differences for all ten decision (power  $(1-\beta) = .80$ ,  $\alpha = .005$  (two-tailed), and  $d = .30$ ) the sample size would have to increase to 596 participants.

differences in lying (as propagated by Kajackaite and Gneezy (2017)). It has been observed, for example, that women are more honest than men where dishonesty benefits the liar at someone else's cost (e.g., Abeler et al., 2019; Capraro, 2018; Grosch and Rau, 2017), but this observation is not without exceptions (e.g., Childs, 2012; Gylfason et al., 2013; Vranceanu and Dubart, 2019). We believe that our results provide new insights in this discussion, but further studies on the relationship between stakes and gender would certainly be beneficial.

Although sensitivity to stakes seemed to drive decisions to some extent, about 11% of senders never lied. Such lack of willingness to lie could be associated with guilt (Erat and Gneezy, 2012), which resonates well with our results seeing as guilt is associated with Honesty-Humility (Fang et al., 2019) and Honesty-Humility is associated with lying in our study. Erat and Gneezy (2012) argue that people might experience guilt when lying because they would be violating a social norm. More specifically, that the amount of guilt people experience could be contingent on a descriptive norm – “their beliefs about adherence to the norm in their peer group”. (p. 730). Future research should address descriptive norms by e.g., assessing the relationship between conformity and deceptive behavior.

### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

### Data availability

Data will be made available on request.

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### Appendices. Supplementary data

Supplementary material related to this article can be found online at <https://doi.org/10.1016/j.econlet.2022.110926>.

### References

- Abeler, J., Nosenzo, D., Raymond, C., 2019. Preferences for truth-telling. *Econometrica* 87, 1115–1153.
- Ashton, M.C., Lee, K., 2005. Honesty-humility, the big five, and the five-factor model. *J. Pers.* 73, 1321–1354.
- Ashton, M.C., Lee, K., 2009. The HEXACO-60: A short measure of the major dimensions of personality. *J. Pers. Assess* 91, 340–345.
- Buchan, N.R., Croson, R.T.A., Solnick, S., 2008. Trust and gender: An examination of behavior and beliefs in the investment game. *J. Econ. Behav. Organ.* 68, 466–476.
- Capraro, V., 2018. Gender differences in lying in sender-receiver games: A meta-analysis. *Judgm. Decis. Mak.* 13, 345–355.
- Charness, G., Blanco-Jimenez, C., Ezquerro, L., Rodriguez-Lara, I., 2019. Cheating, incentives, and money manipulation. *Exp. Econ.* 22, 155–177.
- Childs, J., 2012. Gender differences in lying. *Econom. Lett.* 114, 147–149.
- Depaulo, B.M., Kashy, D.A., 1998. Everyday lies in close and casual relationships. *J. Pers. Soc. Psychol.* 74, 63–79.
- Dreber, A., Johannesson, M., 2008. Gender differences in deception. *Econom. Lett.* 99, 197–199.
- Eckel, C.C., Grossman, P.J., 1998. Are women less selfish than men? Evidence from dictator experiments. *Econ. J.* 108, 726–735.
- Ellingsen, T., Johannesson, M., 2004. Promises, threats and fairness. *Econ. J.* 114, 397–420.
- Erat, S., Gneezy, U., 2012. White lies. *Manage. Sci.* 58, 723–733.
- Ezquerro, L., Kolev, G.I., Rodriguez-Lara, I., 2018. Gender differences in cheating: Loss vs gain framing. *Econ. Lett.* 163, 46–49.
- Fang, Y., Dong, Y., Fang, L., 2019. Honesty-humility and prosocial behavior: The mediating roles of perspective taking and guilt-proneness. *Scand. J. Psychol.* 60, 386–393.
- Faul, F., Erdfelder, E., Buchner, A., Lang, A.-G., 2009. Statistical power analyses using G\*Power 3.1: Tests for correlation and regression analyses. *Behav. Res. Methods* 41, 1149–1160.
- Fehr, E., Fischbacher, U., Gächter, S., 2002. Strong reciprocity, human cooperation, and the enforcement of social norms. *Hum. Nat.* 13, 1–25.
- Fehr, E., Gächter, S., 2000. Cooperation and punishment in public goods experiments. *Amer. Econ. Rev.* 90, 980–994.
- Fischbacher, U., Föllmi-Heusi, F., 2013. Lies in disguise – An experimental study on cheating. *J. Eur. Econ. Assoc.* 11, 525–547.
- Gneezy, U., 2005. Deception: The role of consequences. *Amer. Econ. Rev.* 95, 384–394.
- Grosch, K., Rau, H.A., 2017. Gender differences in honesty: The role of social value orientation. *J. Econ. Psychol.* 62, 258–267.
- Gylfason, H.F., Arnardóttir, A.A., Kristinsson, K., 2013. More on gender differences in lying. *Econom. Lett.* 119, 94–96.
- Gylfason, H.F., Olafsdóttir, K., 2017. Does Gneezy's cheap talk game measure trust? *J. Behav. Exp. Econ.* 67, 143–148.
- Kajackaite, A., Gneezy, U., 2017. Incentives and cheating. *Games Econ. Behav.* 102, 433–444.
- Kleinknecht, J., 2019. A man of his word? An experiment on gender differences in promise keeping. *J. Econ. Behav. Organ.* 168, 251–268.
- Lee, K., Ashton, M.C., Shin, K.-H., 2005. Personality correlates of workplace anti-social behavior. *Appl. Psychol.* 54, 81–98.
- Leibbrandt, A., Maitra, P., Neelim, A., 2018. Large stakes and little honesty? Experimental evidence from a developing country. *Econom. Lett.* 169, 76–79.
- Mazar, N., Ariely, D., 2006. Dishonesty in everyday life and its policy implications. *J. Public Policy Mark* 25, 117–126.
- Niederle, M., 2016. Gender. In: Kagel, J., Roth, A.E. (Eds.), *Handbook of Experimental Economics*, second ed. Princeton University Press, pp. 481–553.
- Biziou-van Pol, L., Haenen, J., Novaro, A., Liberman, A.O., Capraro, V., 2015. Does telling white lies signal pro-social preferences? *Judgm. Decis. Mak* 10, 538–548.
- Sutter, M., 2009. Deception through telling the truth?! experimental evidence from individuals and teams. *Econ. J.* 119, 47–60.
- Vranceanu, R., Dubart, D., 2019. Deceitful communication in a sender-receiver experiment: Does everyone have a price? *J. Behav. Exp. Econ.* 79, 43–52.



### **3.4 Paper IV: Do different social norms affect behavior in Gneezy's cheap-talk game?**



Do different social norms affect behavior in Gneezy's cheap talk game?

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The authors declare that there are no conflicts of interest with respect to the research, authorship, and/or publication of the article.

**Abstract**

We investigate whether descriptive and injunctive social norms affect lying behavior differently in Gneezy's cheap-talk game. We find no difference in lying behavior across norms, suggesting that descriptive social norms are sufficient to explain why people do not lie. Moreover, our results suggest that guilt rather than social norms explains why people do not lie.

**Highlights**

- We find no difference in lying behavior under descriptive and injunctive social norms.
- Participants do not experience greater guilt for lying with a more honest peer group.
- Descriptive social norms are sufficient to explain non-lying behavior.

**Keywords:** honesty-humility; deception; lying; dishonesty; unethical behavior; economic games; injunctive social norms; descriptive social norms

JEL classification: C90; C70; D80

## 1. Introduction

Dishonesty is a serious social and economic challenge with billions of USD lost to individual income tax evasion and insurance fraud (Moshagen & Hilbig, 2017; Mazar & Ariely, 2006). Understanding dishonesty is, therefore, valuable in both economic and social settings (Mazar & Ariely, 2006; Rosenbaum et al., 2014).

In their influential paper on lies, Erat and Gneezy (2012) argue for the importance of guilt and violation of social norms in studying dishonesty. Specifically, they reason that people experience guilt when lying because they break a social norm. As Erat and Gneezy explain, “people would feel greater guilt about lying when they expect their peer group to be more honest.” (p. 730). Thus, the guilt people feel is related to the descriptive norm in their peer group.

We build on this work by testing the role of different social norms as well as guilt in lying behavior. Social norms can be divided into descriptive and injunctive norms. Descriptive norms pertain to which behavior is most common in a situation, with injunctive norms pertaining to which behavior is considered most appropriate by others (Cialdini et al., 1991; Hallsworth et al., 2017; Keizer et al., 2008). Numerous studies have compared the effects of descriptive and injunctive norms on attitudes and behaviors (e.g., Hallsworth et al., 2017; Smith et al., 2012; Elek et al., 2006) with varying effects. In the literature on Gneezy’s cheap-talk game Erat and Gneezy (2012) propose that injunctive and descriptive norms should be highly correlated, given that peer group members are not hypocrites. Therefore, Erat and Gneezy argue that in deception games focusing only on a descriptive norm will suffice in explaining why people do not lie. However, this has never been empirically tested.

We conduct an experiment to elucidate how different social norms affect lying in deception games. Specifically, we test Erat and Gneezy’s (2012) argument that focusing only on a descriptive norm is adequate when examining why people tell the truth in a deception game.

To test this, we use Gneezy's standard cheap-talk game. A descriptive-norm message would inform senders that around 65% of students participating in this kind of study in Iceland lie for own interest. However, an injunctive-norm message would inform them that around 3% of Icelanders believe that lying for your own interests can be justified, namely the "beliefs about what fraction of people find lying acceptable." (Erat & Gneezy, 2012, p. 730).

If people feel more guilty when exposed to the injunctive norm than the descriptive norm, it could be because the injunctive norm implies that lying is morally wrong. We find no difference in lying behavior for the descriptive and injunctive norms groups, supporting Erat and Gneezy's (2012) argument that only focusing on a descriptive norm is adequate when examining why people tell the truth in a deception game. However, contrary to Erat and Gneezy's argument we did not find that senders in the injunctive-norms group felt guiltier about lying than senders in the descriptive-norms group.

## **2. Experimental design**

The study was carried out on 138 undergraduate students from the University of Iceland and Reykjavik University (69 senders and 69 receivers). A total of 11 male and 58 female senders took part in the experiment: 35 in the injunctive-norms group and 34 in the descriptive-norms group.

As in Erat and Gneezy (2012) the experiment was conducted in a classroom setting, and the senders were randomly assigned to two conditions by social norms. For injunctive social norms, participants were exposed to a short paragraph that read "Before you decide which message to send, we would like to inform you that around 3% of Icelanders believe that it can be justified to lie for your own interests." (European Values Study, 2008). For descriptive social norms participants were exposed to a short paragraph that read "Before you decide

which message to send, we would like to inform you that around 65% of students participating in this kind of study in Iceland lie for own interest.” (Gylfason et al, in press). Subsequently, two players, a sender and a receiver, play a single game anonymously. The sender is asked to send the receiver either of two messages: “Option A will earn you more money than option B” or “Option B will earn you more money than option A.” Only the sender is informed of the monetary payoff associated with each option (“Option A: ISK 500 to you and ISK 1,000 to the other student” or “Option B: ISK 1,000 to you and ISK 500 to the other student”), whereas the receiver must choose between options A and B based on the message he or she receives (ISK = Icelandic kronor; US \$1  $\approx$  ISK 128). The two options lead to different payoffs for both players, but the receiver’s choice alone determines the payment for both players. For example, if the receiver chooses option A, the sender earns ISK 500 and the receiver earns ISK 1,000. However, if the receiver chooses option B, the sender earns ISK 1,000 while the receiver earns ISK 500. To secure full anonymity for senders and still have full knowledge of every senders’ behavior, senders use a private identification number made only available to them.

After playing the game, senders provided demographic information and answered a question on guilt related to their behavior in the game “When you think about the message you chose to send the receiver, how much or little guilt did you experience?” The answers ranged from 0 “None at all” to 5 “Very much”. Additionally, senders provided information on what message they expected others in their group to send to receivers, a true message or a deceptive one. The sender has the option of sending a deceptive message without any consequences or retaliation. That message – a lie – has been interpreted as a dishonest message (e.g., Capraro, 2018; Fischbacher & Föllmi-Heusi, 2013; Mazar & Ariely, 2006) although Gneezy (2005) never described the behavior of senders who deceive as dishonest nor the senders themselves as dishonest. Apparently, the interpretation of the senders’ behavior as (dis)honest was merely

an addition by others, although the validity of describing the behavior of senders in Gneezy's cheap-talk game as honest or dishonest was never tested. According to Erat and Gneezy (2012) and Sutter (2009), displaying deceptive behavior does not necessarily mean displaying dishonest behavior. They list various deceptive behaviors of which only few could be described as dishonest. For instance, deceiving in a poker game, in a football match or at war is not thought of as dishonest. Accordingly, it is imperative to assess if Gneezy's game is a valid measure of dishonesty before its use as such. We, therefore, asked participants to complete the Icelandic version of the 10 items measuring Honesty-Humility in the HEXACO Personality Inventory-Revised (Ashton & Lee, 2009). The answers ranged from 1 (totally disagree) to 5 (totally agree) and were averaged to create a summary measure (Cronbach's  $\alpha = .64$ ). Individuals scoring low on Honesty-Humility are more willing to cheat or steal to obtain economic gains (Ashton & Lee, 2005). Honesty-Humility has a robust association with (dis)honest behavior (Hilbig & Zettler, 2015) and decisions in various economic games (e.g., Hilbig, et al., 2013).

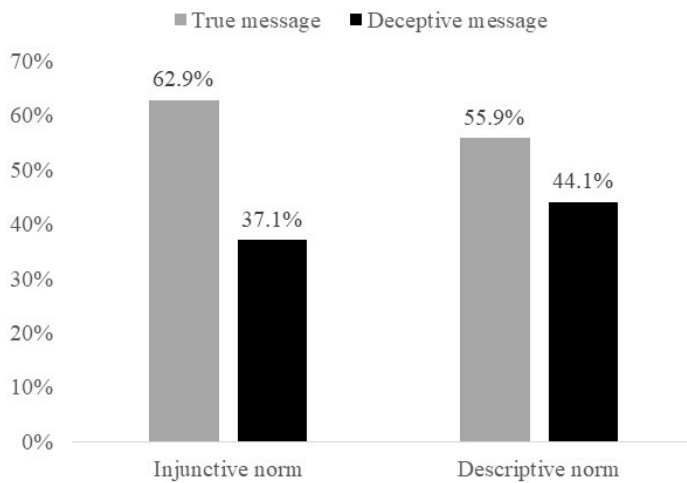
### 3. Results

In total, 40.6% of senders sent a deceptive message compared to 65% in Gylfason et al. (in press), 44% in Gylfason et al. (2013), 44% in Sutter (2009) and 36% in Gneezy (2005). There was a significant association between type of social norm and what message senders expected others in their group to send,  $\chi^2(1, N = 69) = 6.659, p = .010$ . 42.9% of senders in the injunctive-norms group expected others in their group to send a deceptive message compared to 73.5% in the descriptive-norms group.

As can be seen in Fig. 1, 37.1% of the senders in the injunctive-norms group and 44.1% of the senders in the descriptive-norms group sent a deceptive message. In line with Erat and Gneezy's (2012) argument the difference was statistically insignificant,  $\chi^2(1, N = 69) = .348,$

$p = .555$ , indicating that focusing only on either of those two social norms would suffice when studying lying within a deception game<sup>1</sup>.

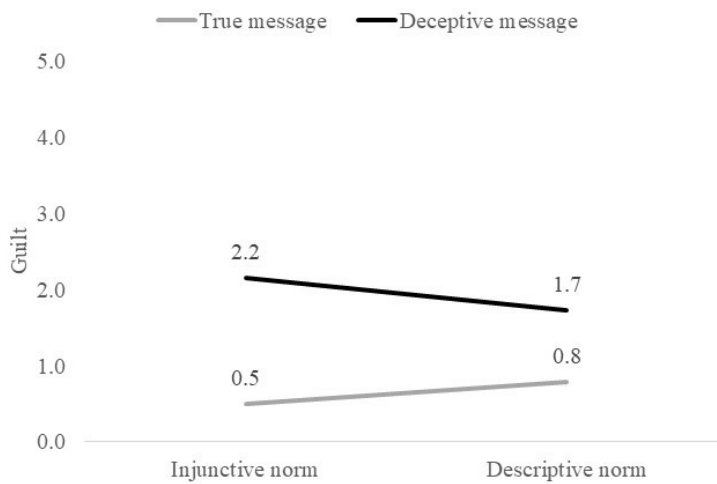
Fig. 1. The percentage of deceptive and true messages sent by injunctive and descriptive norms.



Consistent with Erat and Gneezy (2012), senders who lied felt guiltier than those that didn't lie,  $F(1, 65) = 16.31, p < .001$  (Fig. 2). However, contrary to Erat and Gneezy, senders in the injunctive-norms group did not feel guiltier about lying than senders in the descriptive-norms group  $F(1, 65) = 0.04, p = .84$  even though they expect others in their group to be more honest. Furthermore, the interaction between social norms and lying was not significant  $F(1, 65) = 1.22, p = .27$ .

<sup>1</sup> Given our sample size, with type I error  $\alpha = .05$  and power  $(1 - \beta) = .80$ , the statistical test is able to detect an effect size of  $w = 0.34$ . The observed effect size was  $w = 0.20$  (Faul, Erdfelder, Buchner, & Lang, 2009; Faul, Erdfelder, Lang, & Buchner, 2007).

Fig. 2. Senders guilt by social norms and messages sent.



Additionally, in line with previous authors interpretation of the behavior of senders as dishonest (e.g., Capraro, 2018; Fischbacher & Föllmi-Heusi, 2013; Mazar & Ariely, 2006), we found, for the first time, that the lying behavior of senders correlated significantly and meaningfully with their score on Honesty-Humility,  $r_p = -.33, p = .006$  (when pooling across social norms),  $r_p = -.48, p = .003$  for the injunctive group and  $r_p = -.24, p = .17$  for the descriptive group.

#### 4. Discussion

We investigated if descriptive and injunctive social norms affect lying behavior differently in Gneezy's (2005) cheap-talk game. Although Erat and Gneezy (2012) emphasized the importance of distinguishing between injunctive and descriptive social norms when investigating effects on lying behavior, they argued that these two norms should be highly correlated and lead to similar results. We fail to reject that hypothesis, suggesting that it might be adequate to focus only on descriptive norms when explaining why people do not lie.

Contrary to Erat and Gneezy's (2012) suggestion that those expecting their peer group to be more honest would feel guiltier about lying, we did not find that senders in the injunctive-norms group felt guiltier about lying than senders in the descriptive-norms group. If injunctive and descriptive social norms are highly correlated as Erat and Gneezy argue, then using those two norms should have been a valid way to manipulate the groups expectation. However, there is one caveat that must be mentioned that might explain why we do not find difference in guilt between the injunctive-norms and descriptive-norms groups. We chose our injunctive norm from a survey among the Icelandic public (European Values Study, 2008). A major concern with self-reports is the tendency to respond systematically in a way likely to be approved by others (Vésteinsdóttir et al., 2015). A sounder way to secure our injunctive norm would have been to use incentivized measures similar to Schram et al. (2022). Because as is evident in Schram's et al. study on corruption, estimates for injunctive norms may differ by type of method used, self-report vs. incentivized elicitation method. However, given our low injunctive norm (3%), it is probable that an incentivized method would have given us an injunctive norm closer to our descriptive norm. We would, therefore, not expect our results to change, neither for lying nor for guilt.

In light of the emphasis on interpreting the behavior of senders as (dis)honest in Gneezy's (2005) cheap-talk game (e.g., Capraro, 2018; Fischbacher & Föllmi-Heusi, 2013; Mazar & Ariely, 2006) we felt it important to correlate senders' decision and Honesty-Humility, especially concerning Gylfason et al. (2016) non-significant results. Our results indicate that Gneezy's game appears to be a valid measure of (dis)honesty, as senders with low Honesty-Humility were more likely to send a deceptive message. To the best of our knowledge, this is the first study to report a statistically significant association between the behavior of senders and their scores on a personality trait measuring (dis)honesty. We believe that these findings

are empirically important as they indicate that the behavior of senders in Gneezy's (2005) game can be interpreted as (dis)honest.

What makes the deception games particularly appealing is that the experimenter has full knowledge of the actions of every sender, making it possible to study (dis)honest behavior in relation to social norms and guilt, which could be important in explaining heterogeneity in (dis)honesty. Given that moral emotions, such as guilt, differ across individuals (e.g. by age, gender, and personality) (Tangney et al., 2007) future research should focus on how guilt mediates prosocial behaviors and (dis)honesty.

## References

- Ashton, M.C., Lee, K., 2005. Honesty-Humility, the Big Five, and the five-factor model. *J. Personality* 73, 1321-1354.
- Ashton, M.C., Lee, K., 2009. The HEXACO-60: A short measure of the major dimensions of personality. *J. Pers. Assess.* 91, 340-345.
- Capraro, V., 2018. Gender differences in lying in sender-receiver games: A meta-analysis. *Judgm. Decis. Mak.* 13, 345-355.
- Cialdini, R. B., Kallgren, C. A., Reno, R. R., 1991. A focus theory of normative conduct: A theoretical refinement and reevaluation of the role of norms in human behavior. *Adv. Exp. Soc. Psychol.* 24, 201-234.
- Elek, E., Miller-Day, M., Hecht, M. L., 2006. Influences of personal, injunctive, and descriptive norms on early adolescent substance use. *J. Drug Issues* 36, 147-172.
- Erat, S., Gneezy, U., 2012. White lies. *Manage. Sci.* 58, 723-733.
- European Value Study, 2008. European values study 2008. GESIS Data Archive, Cologne.
- Faul, F., Erdfelder, E., Buchner, A., Lang, A.-G., 2009. Statistical power analyses using G\*Power 3.1: Tests for correlation and regression analyses. *Behav. Res. Methods* 41, 1149-1160.
- Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A., 2007. G\*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behav. Res. Methods* 39, 175-191.
- Fischbacher, U., Föllmi-Heusi, F., 2013. Lies in disguise – An experimental study on cheating. *J. Eur. Econ. Assoc.* 11, 525-547.
- Gneezy, U., 2005. Deception: The role of consequences. *Amer. Econ.Rev.* 95, 384-394.
- Gylfason, H.F., Arnardottir, A.A., Kristinsson, K., 2013. More on gender differences in lying. *Econ. Lett.* 119, 94-96.

- Gylfason, H. F., Halldorsson, F., Kristinsson, K. (2016). Personality in Gneezy's cheap talk game: The interaction between Honesty-Humility and Extraversion in predicting deceptive behavior. *Pers. Individ. Differ.* 96, 222-226.  
<http://dx.doi.org/10.1016/j.paid.2016.02.075>
- Hallsworth, M., List, J. A., Metcalfe, R. D., Vlaev, I., 2017. The behavioralist as tax collector: Using natural field experiments to enhance tax compliance. *J. Public Econ.* 148, 14-31.
- Hilbig, B.E., Zettler, I., 2015. When the cat's away, some mice will play: A basic trait account of dishonest behavior. *J. Res. Pers.* 57, 72-88.
- Hilbig, B.E., Zettler, I., Leist, F., Heydasch, T., 2013. It takes two: Honesty-Humility and Agreeableness differentially predict active versus reactive cooperation. *Pers. Individ. Dif.* 54, 598-603.
- Keizer, K., Lindenberg, S., Steg, L., 2008. The spreading of disorder. *Science* 322, 1681-1685.
- Mazar, N., Ariely, D., 2006. Dishonesty in everyday life and its policy implications. *J. Public Policy Mark.* 25, 117-126.
- Moshagen, M., Hilbig, B. E., 2017. The statistical analysis of cheating paradigms. *Behav. Res.* 49, 724-732.
- Rosenbaum, S. M., Billinger, S., Stieglitz, N., 2014. Let's be honest: A review of experimental evidence of honesty and truth-telling. *J. Econ. Psychol.* 45, 181-196.
- Smith, J. R., Louis, W. R., Terry, D. J., Greenaway, K. H., Clarke, M. R., Cheng, X., 2012. Congruent or conflicted? The impact of injunctive and descriptive norms on environmental intentions. *J. Environ. Psychol.* 32, 353-361.
- Sutter, M., 2009. Deception through telling the truth?! Experimental evidence from individuals and teams. *Econ. J.* 119, 47-60.

Tangney, J. P., Stuewig, J., Mashek, D. J., 2007. Moral emotions and moral behavior. *Annu. Rev. Psychol.* 58, 345-372.

Vésteinsdóttir, V., Reips, U.-D., Joinson, A., Thorsdottir, F., 2015. Psychometric properties of measurements obtained with the Marlow-Crowne Social Desirability Scale in an Icelandic probability based Internet sample. *Comput. Hum. Behav.* 49, 608-614.



### **3.5 Paper V: Does Gneezy's cheap talk game measure trust?**





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## Does Gneezy's cheap talk game measure trust?



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## ABSTRACT

In recent years, researchers have used Gneezy's cheap game to measure trust. In this paper, we examine the interpretation of trust in Gneezy's cheap talk game. In his game, the behavior of receivers has been described as trusting if they choose the option recommended by the sender. We report three studies using Gneezy's cheap talk game. In the first one receivers were given the option of buying information on previous game behavior of their sender. In the second study, the actions of the receivers were compared to their answers on the World Values Survey question on trust; and in the third study, a target-specific measure of trust was compared to the actions of the receivers. In these three studies, we find evidence that casts doubt on the use of Gneezy's cheap talk game as a behavioral measurement of trust in economic experiments.

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## 1. Introduction

Trust is valuable and has important implications for economic performance (Zak and Knack, 2001; Johansson-Stenman, Mahmud, and Martinsson, 2005; Buchan, Croson, and Solnick, 2008). Transaction costs in the form of monitoring costs are higher where trust is low, and thus, resources are not used in the most efficient manner (Knack and Keefer, 1997). Therefore, it is important to measure it accurately and reliably.

The challenge lies in that trust can be difficult to define and measure (Glaeser, Laibson, Scheinkman, and Soutter, 2000; McEvily and Tortoriello, 2011; McEvily, Radzevick, and Weber, 2012; Simpson, 2012). Smedslund's (1997) simple definition of trust is somewhat tailored to how valuable trust is for economic performance. His definition of trust is: if Helen trusts Alexandra, then Helen believes Alexandra will not do anything bad to Helen. And hence, Helen does not have to spend limited resources monitoring Alexandra or take out an insurance to guard against her.

Recently McEvily et al. (2012) introduced the distrust game, a novel behavioral measure of trust, where participants are able to pay to avoid being financially vulnerable to the decisions of their counterparts. McEvily et al. (2012), furthermore, called for additional behavioral measures on trust to supplement both Berg, Dickhaut, and McCabe's (1995) investment game (a behavioral measure

using choice to infer preference) and various attitudinal measures on trust, where beliefs are surveyed to give insight into what people would do in a given situation (McEvily et al., 2012).

In recent papers, the behavior of receivers in Gneezy's (2005) cheap talk game has been described as trusting if they chose the option their sender recommended (Dreber and Johannesson, 2008; Peeters, Vorsatz, and Walzl, 2008; Croson and Gneezy, 2009; Sutter, 2009; Childs, 2012; Ergun, García-Munoz, and Rivas, 2012; Gylfason, Arnardottir, and Kristinsson, 2013). Dreber and Johannesson (2008), for example, used Gneezy's cheap talk game in their experiment to "test for a difference in lying and trusting behavior between men and women." (p. 198). Moreover, they offered this as an operationalization of trust: "The extent to which receivers trusted the message of the sender was measured as the fraction of individuals following the advice offered by the sender." (p. 197).

Gneezy's (2005) interest was to study deception in the behavior of senders and initially he didn't suggest that his cheap talk game could be used to measure trust in the behavior of receivers. However, in a later paper he used a paper by Dreber and Johannesson (2008) to argue "that women trust less than or the same as men ...." (Croson and Gneezy, 2009, p. 460). From reading his paper it is clear that Croson and Gneezy accept that Dreber and Johannesson were measuring trust as they write "Anna Dreber and Johannesson (2008) compared trusting behavior between men and women using a different experimental setting introduced by Gneezy (2005). The setting consists of a sender-receiver game in which the sender

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has a monetary incentive to send a deceptive message to the receiver, and the receiver can either act according to the message or not, indicating distrust. They found no difference in trusting behavior between men and women, as indicated by receivers acting in accordance with the message sent.” (p. 460).

It appears that this interpretation of the behavior of receivers as trusting was merely an addition by various authors (e.g. Dreber and Johannesson, 2008; Childs, 2012; Gylfason et al., 2013; Peeters et al., 2008), as they never tested specifically whether it was valid to describe the behavior of senders as trusting or distrusting. If applicable, however, this addition could be valuable to research on trust as an additional behavioral measure. For one thing, Gneezy's (2005) cheap talk game is simpler to administer than both the distrust game (McEvily et al., 2012) and the investment game (Berg et al., 1995).

In Gneezy's (2005) standard cheap talk game, participants are paired anonymously as sender and receiver. The sender is asked to send the receiver either of these two messages: “Option A will earn you more money than option B” or “Option B will earn you more money than option A”. The sender is fully informed of the monetary payoff of each option, but the receiver has to choose between option A and B based only on the message he receives. The two options lead to different payoffs for both players, where the action taken by the receiver dictates the payment for both players. If the receiver chooses option A the receiver earns more than the sender, and vice versa if option B is chosen.

If Gneezy's (2005) cheap talk game is a valid measure of trust, it could be used to supplement both McEvily's et al. (2012) distrust game and Berg's et al. (1995) investment game. With that in mind and in light of McEvily et al. (2012) emphasizing the need for new behavioral measures of trust, we report results from three studies on the receivers' part of Gneezy's cheap talk game to assess whether the behavior of its receivers can be described as trusting. In the first study, receivers were given the option of buying information on previous game behavior of their sender. In the second study, we compared the actions of the receivers to their answers to the World Values Survey question on trust (Johnson and Mislin, 2012), and in the third study, we used a target-specific measure of trust and compared it to the actions of the receivers (McEvily et al., 2012).

## 2. Study 1

### 2.1. Design and procedures for Study 1

In Study 1, we applied Gneezy's (2005) cheap talk game while making some amendments. The receivers were randomly assigned to two groups, a comparison group and an experimental group, by drawing differently marked pieces of paper from a bag. The receivers in the comparison group took part in a standard Gneezy's (2005) cheap talk game<sup>1</sup> (see Introduction). In order to test whether choosing the sender's message indicated trust on behalf of the receiver, the setup of the experimental group was changed slightly. The receivers, who read the same instructions as the comparison group, were additionally given the opportunity to pay for information on the trustworthiness of their sender. For 10% of their undisclosed expected payout, they had the option to buy information on the previous behavior of their sender in another cheap talk game.<sup>2</sup> By providing information on past behavior of senders, it

<sup>1</sup> The instructions used came from the receiver's part (player 2) of Gneezy (2005) Appendix A.

<sup>2</sup> In order to secure senders for the receivers to play against, senders were chosen from a separate group from another university than the receivers. Senders were randomized into two groups and asked to play Gneezy's (2005) cheap talk game. For the senders' group meant for the receivers in the comparison group, the game

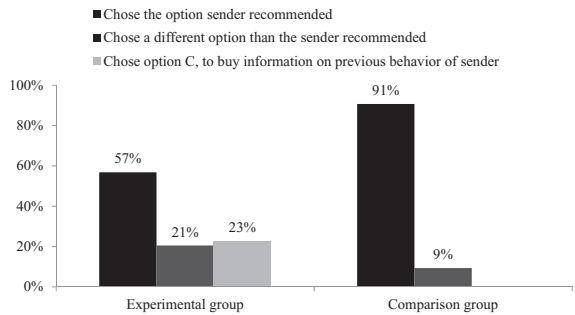


Fig. 1. The percentages of receivers choosing each option (in the comparison group participants were not able to choose option C).

might allow receivers to distinguish between honest senders and dishonest ones (Wibral, 2015). This was implemented by allowing the receivers to choose an additional option to the standard options A and B, namely option C. If a receiver trusts the advice of the respective sender, the receiver is not going to spend money to find out if the sender has previously lied to another receiver (Coleman, 1994). Choosing option C is therefore a clear indication of distrust in a similar way as McEvily et al. (2012) operationalized their measure of distrust by allowing participants to pay not to play their distrust game. It also fits well with how Croson and Gneezy (2009) interpret the behavior of receivers as “the receiver can either act according to the message or not, indicating distrust.” (p. 460).

A total of 87 undergraduate students (27 male and 60 female) took part as receivers in the experiment; 43 in the experimental group and 44 in the comparison group. The experiment was run in February 2013. All receivers were assigned a subject number on a form, and instructed to write their name on it, in order to secure later payment. To protect receivers' privacy, the form with their number and name was returned to them with their payment.

### 2.2. Results and discussion for Study 1

As seen in Fig. 1, 91% of the receivers in the comparison group (playing the standard Gneezy's (2005) game) chose the option the sender recommended. When the receivers in the experimental group were offered to buy additional information, 57% of them chose the option the sender recommended, showing a significant difference in behavior between the two groups ( $\chi^2(1, N=87) = 12.84, p < 0.001$ ).<sup>3</sup> This suggests that the behavior of all receivers in Gneezy's (2005) cheap talk game can hardly be described as trusting if they chose the option the sender recommended.

What is interesting to note is that although 57% of receivers in the experimental group still followed the recommendation of the

was amended in such a way that senders were instructed to send two messages, one of which would be sent to the receiver. They were informed that chance would dictate which of the two messages would be sent to the receiver. They were also told that the receiver would never be informed whether the message sent was true or false. In the senders' group meant for the receivers in the experimental group, the game was amended in such a way that senders were instructed to send two messages. They were told that the receiver would receive their second message and be instructed to choose between A or B. They were also told that the receiver would never be informed whether the second message was true or false. Additionally, they were told that the receiver could get to know if their first message was true or false.

<sup>3</sup> If we were to exclude those who bought information in the experimental group in the analysis, participants in the experimental group were still less likely to choose the option the sender recommended than participants in the control group (74% vs. 91% respectively) ( $\chi^2(1, N=77) = 3.99, p = .046$ ).

sender, there is a significant difference in the behavior between the two groups. There is a fall of 34 percentage points (from 91% to 57%), indicating almost 40% decrease in the frequency of the number of receivers in the experimental group following the option the sender recommended in reference to the comparison group. Such a large difference in behavior between the two groups, without being able to predict who would choose option C, the result suggests that it might be impractical to use Gneezy's (2005) cheap talk game to study what influences trust.

However, this experimental setup is not without limitations. The information sets for the receivers are different between the two types of treatments. The setup in the comparison group might have created a different impression of the senders compared to the setup in the experimental group. In the comparison group receivers might have had the perception that the senders were playing the Gneezy's (2005) cheap talk game for the first time, whereas in the experimental group receivers' perception may have been that the senders had played the game before. This might have caused receivers in the experimental group to favor choosing a different option than the sender recommended, that is to show distrust. Furthermore, we may have prompted participants in the experimental group given the choice to buy information to ask themselves the question *Should I trust*, which could have implied that the sender's advice should perhaps not be trusted (Simpson, 2012). To address this possibility, we ran another cheap talk game study.

### 3. Study 2

#### 3.1. Design and procedures for Study 2

The setup for Study 2 was a standard Gneezy's (2005) cheap talk game (see Introduction) run in June 2014. In the cheap talk game, the receivers do not know, nor will they ever know, the identity of the senders. The only thing they know is that they have been paired with another student from a different class (Gneezy, 2005). In this regard, trust as it appears in this game will never be measured except in a general sense, as how one would predict students in general to act in a similar situation.

In Study 2, before choosing option A or B, each receiver was asked the World Values Survey question on trust: "Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people?" The response categories for the question are "most people can be trusted" and "can't be too careful". It was thought that by exposing participants to the trust question it would trigger them to think, similar to that of the participants in the experimental group in Study 1, that perhaps the sender's advice should not be trusted.

The World Values Survey question on trust has been used to assess the level of social or interpersonal trust in numerous studies and in numerous countries (e.g. Johnson and Mislin, 2012; Irwin and Berigan, 2013; Maseland, 2013) and relates to what Simpson (2012) has called predictive trust. According to Simpson, predictive trust "involves nothing more than a prediction of reliability, and specifically no expectation that the trusted may take account of me in their action." (p. 565). Johnson and Mislin (2012) validated the question by correlating it with the investment game (see Berg et al., (1995) for more information on the investment game). According to Anastasi and Urbina (1997), moderately high correlation between two measures of the same construct implies that they are, in fact, related. Therefore, for the behavior of the receivers to be described as trusting, one would expect a correlation between the receivers' answers on the World Values Survey question and the option they chose in the cheap talk game.

A total of 78 undergraduate students took part as receivers in Study 2; 44 male and 34 female. All receivers were assigned a subject number on a form, and instructed to write their name on it,

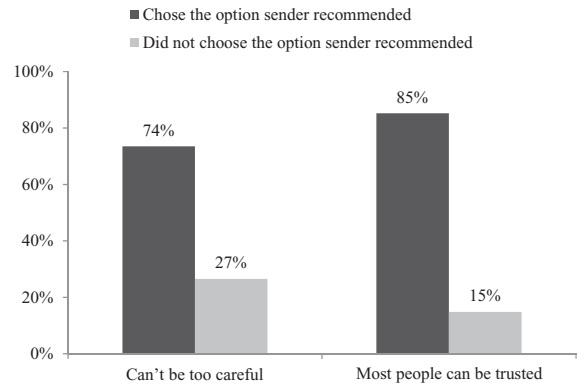


Fig. 2. The percentages of receivers who chose each option in Study 2.

in order to secure later payment. Receivers' privacy was protected as before, by returning the form to them with their payment.

#### 3.2. Results for Study 2

Most receivers (76%) chose the option their sender recommended just like in the comparison group in Study 1. Fig. 2 reveals that there was no significant difference in choice whether the receivers felt most people can be trusted or that they can't be too careful in dealing with people ( $\chi^2(1, N = 76) = 1.38, p = 0.24$ ). The Pearson's correlation was non-significant ( $r = 0.14, p = 0.25$ ), and substantially lower than in Johnson and Mislin (2012) between a set of investment game replications and the trust question in the World Values Survey.

#### 3.3. Discussion for Study 2

The results from Study 2 support the results from Study 1 and as the correlation between the behavior of the receivers and their answers to the World Values Survey question was non-significant, it suggests that the behavior of all receivers in Gneezy's (2005) cheap talk game can hardly be described as trusting. However, it is important that different measures of trust (either behavioral or attitudinal) address the same target. For behavioral, as well as for attitudinal, measures on trust to strongly correlate, the target of trust, to whom or what it is directed, must be the same (McEvily et al., 2012). McEvily et al. reiterated the importance of targets, or objects, when making valid comparisons across trust measures. For example, Helen may exhibit high trust towards Alexandra (target-specific trust) but not towards most people (generalized trust). It would be inaccurate to suppose that Helen's high trust towards Alexandra would extend to other targets; consequently, we must ensure that we have actually measured what we set out to measure. According to McEvily et al. (2012), it is predictable to find no relationship between measures when researchers ignore the target of trust, and therefore it is important to differentiate between generalized trust and a target-specific trust in experimental games.

In Gneezy's (2005) cheap talk game, the behavior of receivers is target-specific, directed at a specific anonymous opponent, while the World Values Survey question is a general measure of trust. However, because of the game's setup, where receivers have no information to assess the senders, a relatively stable disposition such as generalized trust should correlate with their behavior. The lack of association between the two in Study 2 could be due to some ambiguity in the target. To rule that out, we ran the third study and asked the receiver to rate a target-specific question on trust

about the sender. For the behavior of receivers in Gneezy's cheap talk game to be described as trusting (choosing the option their sender recommended), one would expect a moderately high positive correlation with how much they stated that they trusted their senders (Anastasi and Urbina, 1997). According to McEvily et al. (2012), after having re-analyzed Glaeser et al. (2000) data, "...when the target of trust is held constant to "strangers" – anonymous individuals one encounters in passing – Glaeser et al. results reveal strong positive relationships between behavioral and attitudinal measures." (p. 287).

#### 4. Study 3

##### 4.1. Design and procedures for Study 3

###### 4.1.1. Generalized trust

Before taking part in a standard Gneezy's (2005) cheap talk game (see Introduction) receivers answered questions on generalized trust. Instead of using the World Values Survey question on trust (Johnson and Mislin, 2012) as in Study 2, we used a composite measure of generalized trust (Glaeser et al., 2000; Gächter, Herrman, and Thöni, 2004) that among other things included the World Values Survey question. Generalized trust was measured by how much participants agreed or disagreed with the following six statements: "In general, most people can be trusted" (reverse score ( $r$ )), "In general, you can't be too careful in dealing with people", "Most people would take advantage of me if they got the chance", "Most people try to be fair" ( $r$ ), "Most of the time people try to be helpful" ( $r$ ), "Most of the time people are mostly looking out for themselves". The answers ranged from 1 (totally agree) to 5 (totally disagree). The scores were averaged to create a summary measure, with satisfactory internal consistency (Cronbach's  $\alpha = 0.68$ ), where higher values indicate more generalized trust. The composite measure is not an all or nothing measure; it does not require the receivers to take sides, but gives them the opportunity to be less decisive in their answers.

###### 4.1.2. Target-specific trust

After making their decision, but before knowing the outcome of the game, receivers were asked to rate how accurately the statement "I felt that I could not trust the other participant" described how they felt about the sender. The answers ranged from 1 (very well) to 5 (very badly).

A total of 100 undergraduate students (61 male and 39 female) took part as receivers in the study, run in August 2014. As before, all receivers were assigned a subject number on a form, and instructed to write their name on it, in order to secure later payment. Receivers' privacy was protected as before.

##### 4.2. Results for Study 3

Most receivers (74%) chose the option their sender recommended as in Study 2. However, there was a non-significant correlation between the option receivers chose and the generalized measure of trust (Pearson's  $r = 0.09$ ,  $p = 0.37$ ), and a weak positive correlation between the behavior of the receivers and the target specific question on trust (Pearson's  $r = 0.20$ ,  $p = 0.04$ ), explaining 4% of the variance. Fig. 3 reveals how the answers to the target-specific question, "I felt that I could not trust the other participant", were distributed for those receivers that chose the option their sender recommended, as well as for those who did not choose that option. Out of those who chose the option their sender recommended 22% (8% + 14%) lacked trust in the sender, and 27% of those who did not choose the option sender recommended reported that they did not lack trust in the sender.

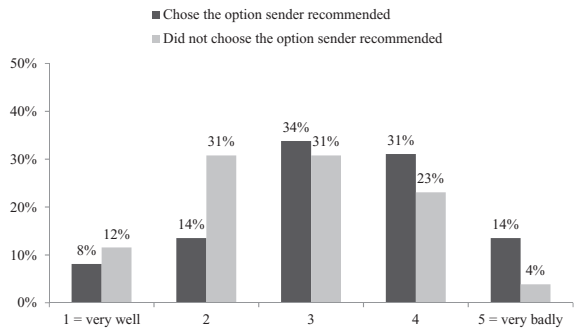


Fig. 3. Distribution of answers to the target specific question, "I felt that I could not trust the other participant", by those who chose or did not choose the option sender recommended.

We used a receiver-operating-characteristic (ROC) curve and the area under the ROC curve to assess the feasibility of the target-specific trust question to discriminate between the two options facing the receivers' in Gneezy's (2005) cheap talk game. The curve is created by calculating the true positive rate (sensitivity) and the false positive rate (1-specificity) and plotting them at various threshold settings (Akobeng, 2007). The ROC analysis is useful when determining the ability of an instrument to discriminate between groups or when comparing the performance of two or more instruments. One of the statistics of the ROC curve analysis is the area under the curve statistic (AUC). The AUC represents the overall performance of an instrument, the larger the area the better the performance will be (Brown and Davis, 2006; Pintea and Moldovan, 2009). The AUC varies from 0.5 to 1.0. AUC = 0.5 denotes that the curve lies along the major diagonal and no discrimination exists. For AUC = 1.0 there is perfect discrimination (Swets, 1988). AUC is the probability that the target-specific trust question will yield higher value for a randomly chosen individual who has chosen the option the sender recommended than for a randomly chosen individual who does not choose the option the sender recommended. An example of two individuals chosen at random, one who followed and one who did not follow the senders recommendation, a AUC = 0.90 means that the probability is 90% that the first individual will have a higher score than the second (Steiner and Cairney, 2007). Generally, the accuracy of an instrument with AUC between 0.5 and 0.6 is judged as a fail, it is thought poor between 0.6 and 0.7, fair between 0.7 and 0.8, good between 0.8 and 0.9 and with AUC over 0.9 the accuracy is excellent (van Gestel and Ferdinand, 2008).

The ROC curve of the target-specific trust question for predicting choosing the option sender recommended was plotted in Fig. 4. The target-specific trust question had a poor discriminative ability with AUC = 0.63 ( $SE = 0.06$ ). Although statistically significantly better than chance alone, the AUC was not high enough to suggest that the target-specific trust question could be relied upon to differentiate choosing the option sender recommended from not choosing the option sender recommended.

##### 4.3. Discussion for Study 3

Consistent with Study 2, there was no correlation between the general measure of trust and the option receivers chose. In Gneezy's (2005) cheap talk game, receivers have no way of knowing who they are playing against. And as such, it was warranted to expect that the behavior of receivers should have correlated with generalized trust, a fairly stable disposition, for it to be a convincing measure of trust. However, generalized trust lacks target speci-

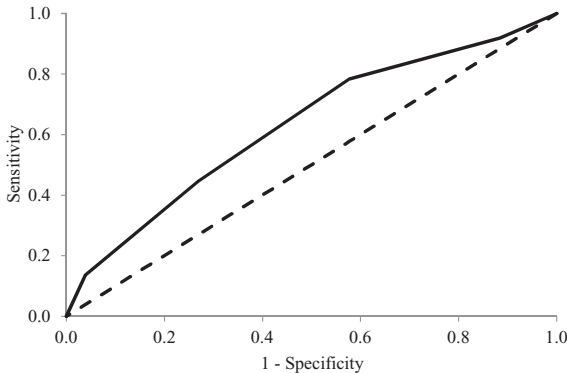


Fig. 4. ROC curve of the target-specific trust question in the prediction of choosing the option sender recommended.

ficity (McEvily et al., 2012), and when the behavior of receivers was correlated with a target specific question on trust to rule out any ambiguity in the target, a weak correlation was found; neither medium nor strong correlation as is necessary in order to infer that both measures are assessing the same construct (Anastasi and Urbina, 1997). Additionally, the target-specific trust question had a poor discriminative ability in predicting choosing the option sender recommended. That is consistent with the results from Study 1 with the difference in the behavior between the experimental and comparison groups in number of receivers that followed the option the sender recommended. As a whole, the results from Study 3 suggest that the attitudinal measures of trust were not strong predictors of choosing the option the sender recommended.

## 5. General discussion

Trust is important (e.g. Antoni and Grimalda, 2016; Cox and Orman, 2015; Krawczyk, 2015; Oh and Hong, 2012) and it is important to learn what affects trust (Evans, Athenstaedt, and Krueger, 2013; Smith, 2011; Yu, Saleem, and Gonzales, 2014), and how to measure trust accurately and reliably (McEvily et al., 2012). With a growing literature on trust (e.g. Poudel and Paudel, 2012; Sun, Wang, and Zhou, 2012; Sapienza, Toldra-Simats, and Zingales, 2013), another reason for a valid evaluation of trust is to be able to answer which factors affect the likelihood of trust (Berg et al., 1995; Kvaløy and Luzuriaga, 2014; Noussair and Stoop, 2015). Without knowing whether a particular construct measures trust makes all research using that construct questionable (Anastasi and Urbina, 1997).

The behavior of receivers in Gneezy's (2005) cheap talk game has been described as trusting, in recent papers, if they chose the option their sender recommended (Dreber and Johannesson, 2008; Childs, 2012; Gylfason et al., 2013). This interpretation was a later addition to the game's promise since Gneezy (2005) never described the behavior of receivers as trusting. If, however applicable, the game could be valuable as an additional behavioral measure of trust which could be used to supplement both McEvily et al. (2012) distrust game and Berg's et al. (1995) investment game. To our knowledge, this study is the first to examine if Gneezy's (2005) cheap talk game is a valid measure of trust, and we have found indications that Gneezy's (2005) cheap talk game does not measure trust in the way some have suggested (e.g. Dreber and Johannesson, 2008; Croson and Gneezy, 2009; Gylfason et al., 2013).

In Study 1, we used behavioral measures of trust (McEvily et al., 2012) where receivers were given the opportunity of pay-

ing for information on previous behavior of senders in Gneezy's (2005) cheap talk game. When we gave receivers the opportunity of paying for information on previous behavior of senders, their behavior was considerably different from the behavior of receivers who did not have that option. That is a clear sign that the behavior of all receivers who chose the same option as their senders recommend cannot be interpreted as trusting, and further casts doubts on the game's usefulness to answer which factors affect the likelihood of trust. We experienced an almost 40% decrease in frequency in behavior of senders between the two groups. And, since it is impossible to predict who drops out (e.g. by buying option C) in the standard setup of Gneezy's game it is probably impractical to use the game in further studies on trust.

In Studies 2 and 3, we used attitudinal measures of trust (Glaeser et al., 2000; Gächter et al., 2004; Johnson and Mislin, 2012), both generic and target-specific, and compared them with the actions of the receivers. According to McEvily et al. (2012) participants "...who express greater trust of strangers in the attitudinal measures send significantly more money in the investment game, but only when playing against an anonymous opponent." (p. 287). All the receivers in Gneezy's (2005) cheap talk game were playing against an anonymous opponent, and both types of generic measures of trust (in Study 2 and 3) measured trust in strangers. Thus, if Gneezy's cheap talk game is a valid behavioral measure of trust there should be a significant association between the actions of the receivers and the two varied generic measures of trusts. We found none. Furthermore, we found only a weak correlation with the target-specific measure of trust, but were expecting at least a moderately high one, which undeniably gives the impression that Gneezy's cheap talk game can hardly be thought of as a valid measure of trust (Anastasi and Urbina, 1997).

The difference between the three Studies in the percentages of receivers that chose the option the sender recommended is noteworthy. In the comparison group in Study 1 91% of receivers chose the option the sender recommended compared to 76% and 74% in Studies 2 and 3, respectively. The difference between Study 1 and Studies 2 and 3 is highly significant ( $p < 0.01$ ). At first glance the results from Study 1 look out of place as the results from Studies 2 and 3 are more in line with previously cited studies such as Gylfason et al. (2013) with 79%, 76% in Dreber and Johannesson (2008), 73% in Childs (2012), and 78% in Gneezy (2005). However, Aoki's et al. (2010) five studies show a range from 64% to 96% for the percentages of receivers that followed the sender's message. We have to allow for the possibility that the participants in Study 1 were somehow different than participants in Studies 2 and 3. However, participants in Study 1 were randomly assigned into two groups, making the two groups comparable. And it is the results from the comparison of these two groups that is most striking, that when given the chance to buy information on previous behavior of senders, receivers behave differently than when not able to buy information on previous behavior of senders.

Gneezy (2005) assumed that most senders expected the receivers to be credulous, and would anticipate a mechanical response from their receiver. Perhaps compliance, "...the general tendency or susceptibility of individuals to comply with requests and obey instructions that they would rather not do, for some immediate instrumental gain" is a better description of receivers' behavior than trust (Gudjonsson, 1989, pp. 535–536). In future work, it would be important to investigate if compliance can explain the mechanical response by receivers.

Trust is difficult to define and measure (Simpson, 2012), and there is no real hallmark instrument available that measures trust. However, if a behavior is supposed to measure trust towards a specific but unknown individual, then a question on how much one trusts that particular individual must have a meaningful correlation with that behavior. We probably have no better valid way

of assessing that particular trust but to ask. It is not our intention to disparage those who have described the behavior of receivers as trusting. Our research is about the option of using the receivers' part of Gneezy's (2005) cheap talk game as a measure of trust. If possible, the game could have been used to continue research on e.g. gender differences in trust (Chaudhuri, Paichayontvijit, and Shen, 2013), differences in trust towards neighborhoods (McEvily et al., 2012) or between different professions (Larsson, 2007; Hardie and Critchley, 2008). But in order for the game to be useful, it has to correlate better with similar measures of trust (McEvily et al., 2012), and have a higher than a 63% probability that an individual, chosen at random and had followed the senders recommendation, replied trusting the sender more than one who did not follow the senders recommendation.

McEvily et al. (2012) have expressed the need for additional behavioral methods to measure trust, a method that is not affected by altruism or risk aversion, and could complement both the investment game and distrust game in trust research. It is our conclusion that using the receivers' part of Gneezy's (2005) cheap talk game as a behavioral measurement of trust in economic experiments is questionable and should be avoided in research as a measure of trust.

## References

- Akobeng, A.K., 2007. Understanding diagnostic tests 3: receiver operating characteristic curves. *Acta Paediatrica* 96, 644–647.
- Anastasi, A., Urbina, S., 1997. *Psychological Testing*. Prentice Hall, New Jersey.
- Antoni, G.D., Grimalda, G., 2016. Groups and trust: experimental evidence on the Olson and Putnam hypotheses. *J. Behav. Exp. Econ.* 61, 38–54.
- Aoki, K., Akai, K., Onoishi, K., 2010. Deception and Confession: Experimental Evidence from a Deception Game in Japan. The Institute of Social and Economic Research, Osaka University, Osaka (Discussion Paper No. 786). Retrieved from [www.iser.osaka-u.ac.jp/library/dp/2010/DP0786.pdf](http://www.iser.osaka-u.ac.jp/library/dp/2010/DP0786.pdf).
- Berg, J., Dickhaut, J., McCabe, K., 1995. Trust, reciprocity and social history. *Games Econ. Behav.* 10, 122–142.
- Brown, C.D., Davis, H.T., 2006. Receiver operating characteristics curves and related decision measures: a tutorial. *Chemom. Intell. Lab. Syst.* 80, 24–38.
- Buchan, N.R., Croson, R.T.A., Solnick, S., 2008. Trust and gender: an examination of behavior and beliefs in the investment game. *J. Econ. Behav. Organ.* 68, 466–476.
- Chaudhuri, A., Paichayontvijit, T., Shen, L., 2013. *J. Econ. Psychol.* 34, 181–194.
- Childs, J., 2012. Gender differences in lying. *Econ. Lett.* 114, 147–149.
- Coleman, J.S., 1994. *Foundations of Social Theory*. Belknap Press, Cambridge, MA.
- Cox, J.C., Orman, W.H., 2015. Trust and trustworthiness of immigrants and native-born Americans. *J. Behav. Exp. Econ.* 57, 1–8.
- Croson, R., Gneezy, U., 2009. Gender differences in preferences. *J. Econ. Lit.* 47, 448–474.
- Dreber, A., Johannesson, M., 2008. Gender differences in deception. *Econ. Lett.* 99, 197–199.
- Ergun, S.J., García-Munoz, T., Rivas, M.F., 2012. Gender differences in economic experiments. *Revista Indernacional De Sociología* 70, 99–111.
- Evans, A.M., Athenstaedt, U., Kruger, J.L., 2013. The development of trust and altruism during childhood. *J. Econ. Psychol.* 36, 82–95.
- Gächter, S., Herrman, B., Thöni, C., 2004. Trust, voluntary cooperation, and socio-economic background: survey and experimental evidence. *J. Econ. Behav. Organ.* 55, 505–531.
- Glaeser, E.L., Laibson, D.I., Scheinkman, J.A., Soutter, C.L., 2000. Measuring trust. *Quart. J. Econ.* 115, 811–846.
- Gneezy, U., 2005. Deception: the role of consequences. *Am. Econ. Rev.* 95, 384–394.
- Gudjonsson, G.H., 1989. Compliance in an interrogative situation: a new scale. *Person. Individ. Differences* 10, 535–540.
- Gylfason, H.F., Arnardottir, A.A., Kristinnsson, K., 2013. More on gender differences in lying. *Econ. Lett.* 119, 94–96.
- Hardie, E.A., Critchley, C.R., 2008. Public perceptions of Australia's doctors, hospitals and health care systems. *Med. J. Aust.* 189, 210–214.
- Irwin, K., Berigan, N., 2013. Trust, culture, and cooperation: a social dilemma analysis of pro-environmental behaviors. *Sociol. Quart.* 54, 424–449.
- Johansson-Stenman, O., Mahmud, M., Martinsson, P., 2005. Does stake size matter in trust games. *Econ. Lett.* 88, 365–369.
- Johnson, N.D., Mislin, A., 2012. How much should we trust the World Values Survey trust question. *Econ. Lett.* 116, 210–212.
- Knack, S., Keefer, P., 1997. Does social capital have an economic payoff? A cross-country investigation. *Quart. J. Econ.* 112, 1251–1288.
- Krawczyk, M., 2015. Trust me, I am an economist." A note on suspiciousness in laboratory experiments. *J. Behav. Exp. Econ.* 55, 103–107.
- Kvaløy, O., Luzzariaga, M., 2014. Playing the trust game with other people's money. *Exp. Econ.* 17, 615–630.
- Larsson, B., 2007. Unpacking professional trust - Dimensions of trust in Swedish auditors' client relations. *Sociol. Res. Online* 12 (2).
- Maseland, R., 2013. Parasitical cultures? The cultural origins of institutions and development. *J. Econ. Growth* 18, 109–136.
- McEvily, B., Tortoriello, M., 2011. Measuring trust in organizational research: review and recommendations. *J. Trust Res.* 1, 23–63.
- McEvily, B., Radzevick, J.R., Weber, R.A., 2012. Whom do you distrust and how much does it cost? An experiment on the measurement of trust. *Games Econ. Behav.* 74, 285–298.
- Noussair, C.N., Stoop, J., 2015. Time as a medium of reward in three social preference experiments. *Exp. Econ.* 18, 442–456.
- Oh, H., Hong, J.H., 2012. Citizens' trust in government and their willingness-to-pay. *Econ. Lett.* 115, 345–347.
- Peeters, R., Vorsatz, M., Walzl, M., 2008. Rewards in an experimental sender-receiver game. *Econ. Lett.* 101, 148–150.
- Pintea, S., Moldovan, R., 2009. The receiver-operating characteristic (ROC) analysis: fundamentals and applications in clinical psychology. *J. Cognitive Behav. Psychother.* 9, 49–66.
- Poudel, B., Paudel, K.P., 2012. Trust, institutions and development. *Appl. Econ. Lett.* 19, 145–147.
- Sapienza, P., Toldra-Simats, A., Zingales, L., 2013. Understanding trust. *Econ. J.* 123, 1313–1332.
- Simpson, T.W., 2012. What is trust? *Pacific Philos. Quart.* 93, 550–569.
- Smedslund, J., 1997. *The Structure of Psychological Common Sense*. Lawrence Erlbaum Associates, Publishers, London.
- Smith, A., 2011. Income inequality in the trust game. *Econ. Lett.* 111, 54–56.
- Steiner, D.L., Cairney, J., 2007. What's under the ROC? An introduction to receiver operating characteristics curves. *Can. J. Psychiatry* 52, 121–128.
- Sun, W.K., Wang, X.H., Zhou, Y.A., 2012. How free do people feel to express their opinions? A study in urban China. *Appl. Econ. Lett.* 19, 1165–1169.
- Sutter, M., 2009. Deception through telling the truth? Experimental evidence from individuals and teams. *Econ. J.* 119, 47–60.
- Swets, J.A., 1988. Measuring the accuracy of diagnostic systems. *Science* 240, 1285–1293.
- van Gastel, W., Ferdinand, R.F., 2008. Screening capacity of the multidimensional anxiety scale for children (MASC) for DSM-IV anxiety disorders. *Depress. Anxiety* 25, 1046–1052.
- Wibral, M., 2015. Identity changes and the efficiency of reputation systems. *Exp. Econ.* 18, 408–431.
- Yu, M., Saleem, M., Gonzales, C., 2014. Developing trust: first impression and experience. *J. Econ. Psychol.* 43, 16–29.
- Zak, P.J., Knack, S., 2001. Trust and growth. *Econ. J.* 111, 295–321.

### **3.6 Paper VI: Trust me. I promise!**



## Title page

Trust me. I promise!

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**Abstract**

We introduce a slightly amended version of Gneezy's cheap-talk game based on commitment. The introduction of commitment shows a stronger association between the receivers' behavior and trust in their sender than found in the original cheap-talk game. Our results indicate that this amended version of Gneezy's cheap-talk game can be used to measure trust.

**Highlights**

- We introduce an amended version of Gneezy's cheap-talk game with commitment.
- We find a stronger association with trust than in the original cheap-talk game.
- Amended version of Gneezy's cheap-talk game can be used to measure trust.

**JEL classification codes**

C91

C70

D91

D83

**Keywords (up to 6 keywords)**

Trust

Promise

Deception

Lying

Economic games

# Trust me. I promise!

## 1. Introduction

Economists have long known that trust has important implications for economic performance (Buchan et al., 2008). Transaction costs are higher where trust is low, yielding an inefficient use of resources (Knack & Keefer, 1997).

Two types of games have primarily been used in economics as incentivized behavioral measures of trust; Berg et al.'s (1995) investment game and McEvily et al.'s (2012) distrust game. Although both games measure trust, they do so differently. In Berg et al.'s investment game, trustors are given monetary endowments, which they are free to either keep or risk sending a fraction to a trustee in hopes of the trustee sending more money back to them; money that is sent multiplies en route from the trustor to the trustee. This model operationalizes trust as the amount sent to the trustee. In McEvily et al., trustors can pay from their endowments to avoid being financially vulnerable to the decisions of their trustee. Here, distrust is the amount paid to avoid being financially vulnerable. As McEvily et al. call for additional behavioral measures of trust, we propose a novel measure, one that is based on a slight adaption to Gneezy's cheap-talk game.

Gneezy's (2005) standard cheap-talk game anonymously pairs participants as sender and receiver. The receiver chooses between two options, A and B, that determine payoffs for both players. However, only the sender is fully informed of the payoffs related to A and B. Before the receiver chooses between option A or option B, the sender is asked to send the receiver one of two messages: "Option A will earn you more money than option B" or "Option B will earn you more money than option A." The behavior of receivers in Gneezy's (2005) cheap-talk has been described as measuring trust (e.g., Bartolomeo et al., 2019; Dreber &

Johannesson, 2008; Gylfason et al., 2013). In particular, Dreber and Johannesson (2008) operationalize trust in Gneezy's game as the proportion of receivers following the advice offered by the senders.

Gylfason and Olafsdottir (2017) examine the interpretation of trust in Gneezy's game and find that receivers' behavior is weakly correlated ( $r = .20$ ) with how much they indicated trusting their senders. They conclude that using the game as a measure of trust should be avoided. To strengthen the measure, we propose a slightly modified version to Gneezy's cheap talk game, adding the opportunity to strengthen the message sent by making it a "promise" (as in Belot et al., 2010). The two additional messages that may be sent are then "I promise that option A will earn you more money than option B" and "I promise that option B will earn you more money than option A."

We interpret choosing one of the new options as a (moral) commitment to truth telling. A promise has been shown to constitute a verbal commitment (Ellingsen & Johannesson, 2004; Ismayilov & Potters, 2016) and commitment engenders trust (Kleinknecht, 2019). Receivers who receive commitment are more trusting and senders who make promises are less opportunistic and more trustworthy (Bartolomeo et al., 2019; Charness & Dufwenberg, 2006; Ismayilov & Potters, 2016; 2017; Vanberg, 2008). Since promises are revealing about stated behavior (Belot et al., 2010; Charness & Dufwenberg, 2006; Ellingsen & Johannesson, 2004; Kleinknecht, 2019; Vanberg, 2008), providing senders with the additional, option of a promise could lead to a stronger association between the receivers' behavior and how much they indicate trusting their senders. This is especially relevant if receivers are aware that senders might experience more guilt following a promise if they lie (Charness & Dufwenberg, 2006) or if receivers recognize that by not making a promise senders could be issuing a

warning “I had the opportunity to send you a promise, but I did not do it!” (Bartolomeo et al., 2019).

Belot et al. (2010) divide promises into two types: voluntary promises and elicited promises. Voluntary promises are in free form, without any restriction or suggestion from the experimenter on the content of the message. Elicited promises, however, are prewritten statements that senders must choose from and send (Chen & Zhang, 2021). There are only a handful of studies that have examined the effect of elicited promises (e.g. Bartolomeo et al., 2019; Charness & Dufwenberg, 2010; Chen & Zhang, 2021), let alone from the perspective of receivers. Bartolomeo et al. find that promises predict receivers’ behavior, while in Charness and Dufwenberg and Chen and Zhang there is no association between promises and receivers’ behavior.

The aim of this study is to determine if the behavior of receivers can be interpreted as trusting when they follow their sender’s advice and explore the effect of elicited promises within Gneezy’s (2005) game. We find a strong correlation between the behavior of receivers and how much they trust their senders. However, we do not find a significant effect of promise on receivers’ behavior.

## **2. Experimental design**

In our amended version of Gneezy’s cheap-talk game, the sender has the additional option of promising the receiver that either option is better; they send the receiver one of four messages:

Message 1: “Option A will earn you more money than option B.”

Message 2: “I promise that option A will earn you more money than option B.”

Message 3: "Option B will earn you more money than option A."

Message 4: "I promise that option B will earn you more money than option A."

As in the original game, only the sender is informed of the monetary payoff associated with each option, whereas the receiver must choose between options A and B based on the message they receive. The two options result in different payoffs for each player, but the receiver's choice alone determines the payment for them both. For example, if the receiver chooses option A, the receiver earns more than the sender (\$12 vs. \$4). However, if the receiver chooses option B, the receiver earns less (\$4 vs. \$12). Following the receiver's decision, both participants are paid.

After playing the game, receivers provide information on age and gender. Subsequently, they are asked both a target-specific question on trust and questions regarding generalized trust. According to McEvily et al. (2012), it is important that different measures of trust address the same target. For example, Mary may express high trust towards Elisabeth (target-specific trust) but not towards most people (generalized trust). To suppose that Mary's trust towards Elisabeth extends to other targets would be imprecise. Therefore, we asked the receivers to rate how much they trusted their sender, as their target-specific trust question. Answers ranged from 1 (very little) to 5 (very much). Additionally, receivers responded to six statements on generalized trust (Glaeser et al., 2000; Gächter et al., 2004): "*In general, most people can be trusted*"(reverse score (r)), "*In general, you can't be too careful in dealing with people*", "*Most people would take advantage of me if they got the chance*", "*Most people try to be fair*"(r), "*Most of the time people try to be helpful*"(r), "*Most of the time people are mostly looking out for themselves*". Responses ranged from 1 (totally agree) to 5 (totally disagree) and were averaged to create a summary measure (Cronbach's  $\alpha = 0.66$ ). Higher values indicated more generalized trust.

190 students, including 95 senders (29 male and 66 female) and 95 receivers (32 male and 63 female), participated in the study.

### 3. Results

Most receivers (67%) chose the option their sender recommended, compared to 78% of receivers in Gneezy (2005), 74% in Gylfason and Olafsdottir (2017), and 76% in Dreber and Johannesson (2008).

We found strong correlation between receivers choosing the option their sender recommended and their response to the target-specific question on trust ( $r_p = .51, p < .001$ ). This correlation is considerably stronger than the weak correlation found by Gylfason and Olafsdottir (2017). It is also stronger than the correlation between the behavior of trustors and their answers to a target-specific trust question in the distrust game (McEvily et al., 2012). A moderately high correlation between two measures of the same construct indicates that they are related (Anastasi & Urbina, 1997). It thus appears that we can interpret the behavior of receivers who choose the option their sender recommends as trusting (Dreber & Johannesson, 2008).

Conversely, receivers' behavior did not correlate with the generalized measure of trust ( $r_p = .11, p = .29$ ), as was also found in Gylfason and Olafsdottir (2017). This is in line with McEvily et al. (2012), who argue that no relationship is to be expected between measures when the target of trust is ignored; in other words, the behavior of receivers is target-specific.

In both instances, 67% of receivers chose the option their sender recommended, compared to 56% of trustors in Charness and Dufwenberg's (2010) experiment on elicited promises. In line with Charness and Dufwenberg (2010) and Chen and Zhang (2021), there was no difference in receivers' behavior following either an elicited promise or no promise,  $\chi^2(1, 95) = 0.01, p = .97$ , nor was there a difference in receivers' target-specific trust following a promise or no promise,  $t(93) = 0.591, p = .556$ . However, in Bartolomeo et al. (2019) there was, in their pooled data, a weak to medium association,  $r_p = .18, p < .01$ , between how players responded to a promise compared to no promise.

Belot et al. (2010) argue that the effect of promises upon the receivers behavior depends among other things on their perception of their sender's trustworthiness; given that receivers' perception was strongly associated with receivers' behavior, we take a closer look at the individual target-specific trust measure to see how this relates to the receivers' choices. Subsequently, we ran a probit regression model on the receivers' decision to follow their sender's recommendation with standardized target-specific trust, promise and their interaction as independent variables. We controlled for standardized generalized measure of trust (Ashraf et al., 2006) and its interaction with promise because generalized trust might hold differently for a standard advice and for a promise (see Table 1). In general, we do not find statistically significant evidence that promise has any impact on receivers' decision, however, it appears that target-specific trust correlates with receivers' decision, especially after an elicited promise. To find out if generalized trust affects receivers' decision to follow their sender's recommendation after a promise, we tested whether the sum of the two coefficients (-0.163 and -0.865) is statistically significant. It is not ( $p = .11$ ).

Table 1. Probit regression model of whether or not receivers followed their sender's recommendation as the dependent variable with promise, standardized target-specific trust, standardized generalized measure of trust and interaction terms as independent variables.

	b	Std. Error	Wald Chi-Square	p-value (two-tailed)
Intercept	0.555	0.199	7.808	.005
Target-specific trust – standardized	0.876	0.258	11.498	.001
Promise	0.469	0.406	1.330	.249
Interaction Target-specific trust x Promise	1.189	0.695	2.930	.087
Generalized measure of trust – standardized	-0.163	0.195	0.699	.403
Interaction Generalized measure of trust x Promise	-0.865	0.557	2.418	.120

#### 4. Conclusion

Our goal was to assess if the behavior of receivers in Gneezy's (2005) cheap-talk game could be interpreted as trusting (e.g., Bartolomeo et al., 2019; Dreber & Johannesson, 2008; Gylfason et al., 2013) and to explore the effect of elicited promises within Gneezy's (2005) game. To do so, we introduce a slightly amended version of Gneezy's (2005) game. Our results indicate that the behavior of receivers can be described as trusting if they choose the option their sender recommended; this is in stark contrast to Gylfason and Olafsdottir's (2017) findings on the receivers of the standard Gneezy's (2005) game.

In line with previous studies, we do not find evidence that receivers, in general, behave differently to an elicited promise by the sender than to a message without promise (e.g. Charness & Dufwenberg, 2010; Chen & Zhang, 2021). However, we find that target-specific

trust correlates with receivers' decision, especially after an elicited promise, corresponding to Belot et al. (2010) who argued that the effect of promises upon the receivers' behavior depends on their perception of their sender's trustworthiness. To better understand the apparent interaction between target-specific trust and how players respond to a promise compared to no promise, future research should elicit receivers' expectations about senders.

## References

- Anastasi, A., Urbina, S. (1997). *Psychological testing*. Prentice Hall, New Jersey.
- Ashraf, N., Bohnet, I., Piankov, N. (2006). Decomposing trust and trustworthiness. *Experimental Economics*, 9, 193-208. <https://doi.org/10.1007/s10683-006-9122-4>
- Bartolomeo, G. D., Dufwenberg, M., Papa, S. (2019). The sound of silence: A license to be selfish. *Economics Letters*, 182, 68-70. <https://doi.org/10.1016/j.econlet.2019.05.045>
- Belot, M., Bhaskar, V., van de Ven, J. (2010). Promises and cooperation: Evidence from a TV game show. *Journal of Economic Behavior & Organization*, 73, 396-405. doi:10.1016/j.jebo.2010.01.001
- Berg, J., Dickhaut, J., McCabe, K. (1995). Trust, reciprocity, and social history. *Games and Economic Behavior*, 10, 122-142. <https://doi.org/10.1006/game.1995.1027>
- Buchan, N. R., Croson, R. T. A., Solnick, S. (2008). Trust and gender: An examination of behavior and beliefs in the Investment Game. *Journal of Economic Behavior and Organization*, 68, 466-476. doi:10.1016/j.jebo.2007.10.006
- Charness, G., Dufwenberg, M. (2006). Promises and partnership. *Econometrica*, 74, 1579-1601. <https://www.jstor.org/stable/4123084>
- Charness, G., Dufwenberg, M. (2010). Bare promises: An experiment. *Economics Letters*, 107, 281-283. doi:10.1016/j.econlet.2010.02.009
- Chen, Y., Zhang, Y. (2021). Do elicited promises affect people's trust? – Observations in the trust game experiment. *Journal of Behavioral and Experimental Economics*, 93, 101726. <https://doi.org/10.1016/j.socec.2021.101726>
- Dreber, A., Johannesson, M. (2008). Gender differences in deception. *Economics Letters*, 99, 197-199. doi:10.1016/j.econlet.2007.06.027
- Ellingsen, T., Johannesson, M. (2004). Promises, threats and fairness. *The Economic Journal*, 114, 397-420. <https://doi.org/10.1111/j.1468-0297.2004.00214.x>
- Gächter, S., Herrmann, B., Thöni, C. (2004). Trust, voluntary cooperation, and socio-economic background: Survey and experimental evidence. *Journal of Economic Behavior & Organization*, 55, 505-531. doi:10.1016/j.jebo.2003.11.006
- Glaeser, E. L., Laibson, D. I., Scheinkman, J. A., Soutter, C. L. (2000). Measuring Trust. *The Quarterly Journal of Economics*, 115, 811-846. <https://doi.org/10.1162/003355300554926>
- Gneezy, U. (2005). Deception: The role of consequences. *The American Economic Review*, 95, 384-394. <https://www.jstor.org/stable/4132685>
- Gylfason, H. F., Arnardottir, A. A., Kristinsson, K. (2013). More on gender differences in lying. *Economics Letters*, 119, 94-96. doi:10.1016/j.econlet.2013.01.027

- Gylfason, H. F., Olafsdottir, K. (2017). Does Gneezy's cheap talk game measure trust? *Journal of Behavioral and Experimental Economics*, 67, 143-148. <http://dx.doi.org/10.1016/j.socec.2016.12.006>
- Ismayilov, H., Potters, J. (2016). Why do promises affect trustworthiness, or do they? *Experimental Economics*, 19, 382-393. doi:10.1007/s10683-015-9444-1
- Ismayilov, H., Potters, J. (2017). Elicited vs. voluntary promises. *Journal of Economic Psychology*, 62, 295-312. <http://dx.doi.org/10.1016/j.joep.2017.07.005>
- Kleinknecht, J. (2019). A man of his word? An experiment on gender differences in promise keeping. *Journal of Economic Behavior and Organization*, 168, 251-268. <https://doi.org/10.1016/j.jebo.2019.10.008>
- Knack, S., Keefer, P. (1997). Does social capital have an economic payoff? A cross-country investigation. *The Quarterly Journal of Economics*, 112, 1251-1288. <https://www.jstor.org/stable/2951271>
- McEvily, B., Radzevick, J. R., Weber, R. A. (2012). Whom do you distrust and how much does it cost? An experiment on the measurement of trust. *Games and Economic Behavior*, 74, 285-298. doi:10.1016/j.geb.2011.06.011
- Vanberg, C. (2008). Why do people keep their promises? An experimental test of two explanations. *Econometrica*, 76, 1467-1480. <https://doi.org/10.3982/ECTA7673>

## 4 Discussion

In this thesis I argue for the importance of ascertaining the validity of the interpretation of actors within Gneezy's (2005) cheap-talk game. Without determining the validity of the interpretation of the game it is difficult to comprehend why it should be used to study honesty or trust. I rely on multiple samples to investigate relations between self-report and behavioral measures of honesty as well as measures of trust.

Gneezy's (2005) game is straightforward. Compared to both the distrust game (McEvily et al., 2012) and the investment game (Berg et al., 1995) it is relatively easy for participants to understand and for researchers to administer.

Although this interpretation of actors' behaviors was not originally intended with the game, it was later said to measure two important constructs – honesty and trust (e.g. Childs, 2012; Dreber & Johannesson, 2008; Fischbacher & Föllmi-Heusi, 2013; Gylfason et al., 2013; Mazar & Ariely, 2006; Peeters et al., 2008). That said, an undemanding, uncomplicated, and valid game could be extremely useful to study honesty and trust.

Validity is possibly the most important issue in a measurement's psychometric quality. Behavioral measurements are meaningful and useful only if they have acceptable validity for the purpose for which they were designed. In the absence of validity, those measurements have no scientific value and might even affect decision-making in a harmful way (Furr, 2018). With his game, Gneezy (2005) intended to study deception in the behavior of senders. He never suggested in his paper that the behavior of senders could be interpreted as dishonest. Therefore, using Gneezy's game to test if women trust less than men or if women are more honest than men has no scientific value without test validity. Consequently, it is important to empirically test if there is any evidence to support the interpretation of the behavior of actors in Gneezy's game as honest and trusting. With more empirical evidence that is available to support the interpretation the more value the game has.

For the senders' part of Gneezy's (2005) game, Paper II revealed that the behavior of senders did not correlate with the Honesty-Humility personality factor. Given that individuals who score low on the Honesty-Humility personality factor are willing to obtain economic gains by cheating or stealing (Ashton et al., 2007) and because the Honesty-Humility personality factor correlates with various exploitative and

deceptive behaviors (Hilbig & Zettler, 2009; Hilbig & Zettler, 2015; Lee & Ashton, 2004; Marcus et al., 2007) the results were somewhat concerning. However, since Gneezy created his game to study deception and using deception in games is not always dishonest (e.g. bluffing in cards) (Erat & Gneezy, 2012; Sutter, 2009) further evidence was needed in order to be able to interpret the behavior of senders as dishonest (McLeish & Oxoby, 2007). Therefore, more evidence was gathered in Papers III and IV.

In Paper III, multiple observations for each sender's behavior were collected and used to create an aggregated measure of honesty. This aggregated measure correlated satisfactorily with the Honesty-Humility personality factor indicating that both instruments were measuring the same concept. This fits well with previous studies that have shown that multiple observations of behavior, compared to one-time interactions, can yield stronger results with self-report measures (Funder & Block, 1989; Rushton et al., 1983).

In Paper IV, self-reported Honesty-Humility measures were correlated with the behavior of senders elicited under two different treatment as injunctive and descriptive social norms. In line with Erat and Gneezy's (2012) suggestion that guilt might be an underlying process that contributed to honesty we found that the lying behavior of senders correlated significantly and meaningfully with their score on the Honesty-Humility personality factor.

For the receivers' part of Gneezy's (2005) game, Papers V and VI followed a familiar pattern as seen in Papers II and IV. Paper V revealed that the behavior of receivers did not correlate with their answers on generalized measures of trust, and only weakly with a measure of target-specific trust. Additionally, when receivers were given the opportunity to pay for information on the previous behavior of their sender in another cheap-talk game (indicating trustworthiness of their sender), compared to taking part in a standard Gneezy's game, their behavior change significantly. Therefore, similar to Paper II, further evidence was needed in order to interpret the behavior of receivers as trusting (McLeish & Oxoby, 2007).

Consequently, in Paper VI, senders were provided with an additional, unconcealed option of a promise to test if that would lead to a stronger association between the receivers' behavior and how much they indicate trusting their senders. It was proposed that if receivers are aware that senders might experience more guilt following a promise if they lie (Charness & Dufwenberg, 2006) or by not making a promise senders could be issuing a warning to receivers (Barolomeo et al., 2019) it could lead to a stronger association between the receivers' behavior and how much they indicate trusting their senders. In stark contrast to Paper V, the results indicated a strong correlation between the behavior of receivers and a measure of

target-specific trust, indicating that both instruments were measuring the same concept.

#### **4.1 Limitations**

This thesis is not without limitations. All the studies were conducted in Iceland, in Icelandic, which limits the generalizability of the results. Only with further research is it possible to learn if the translated versions of the self-report measures of honesty and trust affected the results. Additionally, the findings were based on convenience samples and cannot be generalized to the population level. This limitation is, however, less relevant in experiments because participants are randomized into groups.

#### **4.2 Future directions**

It would be of value to find out if aggregated multiple observations of receivers' behavior in Gneezy's (2005) cheap-talk game correlated strongly with self-report measures of target-specific trust. Such a measure of trust, that is not affected by altruism, would complement other behavioral measures in trust research. Furthermore, this thesis reports mainly on correlations between self-report measures and the behavior of agents in Gneezy's game. Future studies should focus on assessing the associations between the behavior of agents in Gneezy's game with other economic games measuring honesty and trust.

#### **4.3 Conclusion**

Until now, it had never been tested if the behavior of agents in Gneezy's (2005) cheap-talk game could be interpreted as honest or trusting. Although Gneezy's game appeared to measure honesty (e.g., Cohen et al., 2009; Fischbacher & Föllmi-Heusi, 2013; Gibson et al., 2013; Hershfield et al., 2012; Mazar & Ariely, 2006) and trust (e.g., Childs, 2012; Croson & Gneezy, 2009; Dreber & Johannesson, 2008; Ergun et al., 2012; Gylfason et al., 2013; Peeters et al., 2008; Sutter, 2009) empirical evidence was needed to support that interpretation. The more empirical evidence that is available to support the interpretation the better. What this thesis demonstrates is that the behavior of agents in Gneezy's game can be interpreted as honest and trusting, if only by tweaking the game a little.



## References

- American Educational Research Association, American Psychological Association, and National Council on Measurement in Education. (1999). *The standards for educational and psychological testing*. American Educational Research Association.
- Anastasi, A., & Urbina, S. (1997). *Psychological testing*. Prentice Hall.
- Ashton, M. C., Lee, K., & Goldberg, L. R. (2007). The IPIP-HEXACO scales: An alternative, public-domain measure of the personality constructs in the HEXACO model. *Personality and Individual Differences, 42*, 1515–1526.  
<https://doi.org/10.1016/j.paid.2006.10.027>
- Ashton, M.C., & Lee, K. (2009). The HEXACO-60: A short measure of the major dimensions of personality. *Journal of Personality Assessment, 91*, 340-345.  
<https://doi.org/10.1080/00223890902935878>
- Berg, J., Dickhaut, J., & McCabe, K. (1995). Trust, reciprocity, and social history. *Games and Economic Behavior, 10*, 122-142.  
<https://doi.org/10.1006/game.1995.1027>
- Buchan, N.R., Croson, R.T.A., & Solnick, S. (2008). Trust and gender: An examination of behavior and beliefs in the Investment Game. *Journal of Economic Behavior and Organization, 68*, 466-476.  
<https://doi.org/10.1016/j.jebo.2007.10.006>
- Capraro, V. (2018). Gender differences in lying in sender-receiver games: A meta-analysis. *Judgment and Decision Making, 13*, 345-355.  
<https://journal.sjdm.org/18/18619a/jdm18619a.pdf>
- Charness, G., & Dufwenberg, M. (2006). Promises and partnership. *Econometrica, 74*, 1579-1601. <https://www.jstor.org/stable/4123084>
- Childs, J. (2012). Gender differences in lying. *Economics Letters, 114*, 147-149.  
<https://doi.org/10.1016/j.econlet.2011.10.006>
- Childs, J. (2013). Personal characteristics and lying: An experimental investigation. *Economics Letters, 121*, 425-427.  
<http://dx.doi.org/10.1016/j.econlet.2013.09.005>
- Cohen, T. R., Gunia, B. C., Kim-Jun, S. Y., & Murnighan, J. K. (2009). Do groups lie more than individuals? Honesty and deception as function of strategic self-interest. *Journal of Experimental Social Psychology, 45*, 1321-1324.  
<https://doi.org/10.1016/j.jesp.2009.08.007>

- Croson, R., & Gneezy, U. (2009). Gender differences in preferences. *Journal of Economic Literature*, 47, 448-474. doi:10.1257/jel.47.2.448
- Dreber, A., & Johannesson, M. (2008). Gender differences in deception. *Economics Letters*, 99, 197–199. <https://doi.org/10.1016/j.econlet.2007.06.027>
- Erat, S., & Gneezy, U. (2012). White lies. *Management Science*, 58, 723-733. <https://doi.org/10.1287/mnsc.1110.1449>
- Ergun, S. J., García-Munoz, T., & Rivas, M. F. (2012). Gender differences in economic experiments. *Revista Internacional de Sociología*, 70(S1), 99-111. doi10.3989/ris.2011.04.19
- European Values Study. (2008). *European values study 2008*. GESIS Data Archive.
- Fang, Y., Dong, Y., & Fang, L. (2019). Honesty-humility and prosocial behavior: The mediating roles of perspective taking and guilt-proneness. *Scandinavian Journal of Psychology*, 60, 386-393. <https://doi.org/10.1111/sjop.12551>
- Fischbacher, U., & Föllmi-Heusi, F. (2013). Lies in disguise – An experimental study on cheating. *Journal of the European Economic Association*, 11, 525-547. <https://doi.org/10.1111/jeea.12014>
- Funder, D. C., & Block, J. (1989). The role of ego-control, ego-resiliency, and IQ in delay of gratification in Adolescence. *Journal of Personality and Social Psychology*, 57, 1041-1050. <https://psycnet.apa.org/doi/10.1037/0022-3514.57.6.1041>
- Furr, R. M. (2018). *Psychometrics: An introduction*. Sage.
- Gächter, S., Herrman, B., & Thöni, C. (2004). Trust, voluntary cooperation, and socio-economic background: Survey and experimental evidence. *Journal of Economic Behavior and Organization*, 55, 505-531. <https://doi.org/10.1016/j.jebo.2003.11.006>
- Gibson, R., Tanner, C., & Wagner, A. F. (2013). Preferences for truthfulness: Heterogeneity among and within individuals. *American Economic Review*, 103, 532-548. <http://dx.doi.org/10.1257/aer.103.1.532>
- Glaeser, E. L., Laibson, D. I, Scheinkman, J. A., & Soutter, C. L. (2000). Measuring trust. *The Quarterly Journal of Economics*, 115, 811-846. <https://doi.org/10.1162/003355300554926>
- Gneezy, U. (2005). Deception: The role of consequences. *American Economic Review*, 95, 384-394. doi:10.1257/0002828053828662
- Gneezy, U., Rockenbach, B., & Serra-Garcia, M. (2013). Measuring lying aversion. *Journal of Economic Behavior and Organization*, 93, 293-300. <dx.doi.org/10.1016/j.jebo.2013.03.025>

- Grover, S. L. (2005). The truth, the whole truth, and nothing but the truth: The cause and management of workplace lying. *Academy of Management Executive*, 19, 148-157. <https://www.jstor.org/stable/4166184>
- Gylfason, H. F., & Olafsdottir, K. (2017). Does Gneezy's cheap talk game measure trust? *Journal of Behavioral and Experimental Economics*, 67, 143-148. <http://dx.doi.org/10.1016/j.socec.2016.12.006>
- Gylfason, H. F., Halldorsson, F., & Kristinsson, K. (2016). Personality in Gneezy's cheap talk game: The interaction between Honesty-Humility and Extraversion in predicting deceptive behavior. *Personality and Individual Differences*, 96, 222-226. <http://dx.doi.org/10.1016/j.paid.2016.02.075>
- Gylfason, H. F., Arnardottir, A. A., & Kristinsson, K. (2013). More on gender differences in lying. *Economics Letters*, 119, 94-96. <https://doi.org/10.1016/j.econlet.2013.01.027>
- Gylfason, H. F., Vésteinsdóttir, V., Kristinsson, K., Asgeirsdottir, T. L., & Schram, A. (2023). Gender differences in lying: The role of stakes. *Economics Letters*, 222, 110926. <https://doi.org/10.1016/j.econlet.2022.110926>
- Hershfield, H. E., Cohen, T. R., & Thompson, L. (2012). Short horizons and tempting situations: Lack of continuity to our future selves leads to unethical decision making and behavior. *Organizational Behavior and Human Decision Processes*, 117, 298-310. <http://dx.doi.org/10.1016/j.obhdp.2011.11.002>
- Hilbig, B. E., & Zettler, I. (2009). Pillars of cooperation: Honesty-Humility, social value orientations, and economic behavior. *Journal of Research in Personality*, 43, 516-519. <https://doi.org/10.1016/j.jrp.2009.01.003>
- Hilbig, B. E., & Zettler, I. (2015). When the cat's away, some mice will play: A basic trait account of dishonest behavior. *Journal of Research in Personality*, 57, 72-88. <https://doi.org/10.1016/j.jrp.2015.04.003>
- Hilbig, B. E., Zettler, I., & Heydasch, T. (2012). Personality, punishment and public goods: Strategic shifts towards cooperation as a matter of dispositional Honesty-Humility. *European Journal of Personality*, 26, 245-254. <https://doi.org/10.1002/per.830>
- Johansson-Stenman, O., Mahmud, M., & Martinsson, P. (2013). Trust, trust games and stated trust: Evidence from rural Bangladesh. *Journal of Economic Behavior and Organization*, 95, 286-298. doi:10.1016/j.jebo.2011.06.022
- Johnson, N. D., & Mislin, A. (2012). How much should we trust the World Values Survey trust question? *Economics Letters*, 116, 210-212. <http://dx.doi.org/10.1016/j.econlet.2012.02.010>
- Knack, S., & Keefer, P. (1997). Does social capital have an economic payoff? A cross-country investigation. *Quarterly Journal of Economics*, 112, 1251-1288. <https://doi.org/10.1162/003355300555475>

- Lee, K., & Ashton, M. C. (2004). Psychometric properties of the HEXACO Personality Inventory. *Multivariate Behavioral Research, 39*, 329-358. [https://doi.org/10.1207/s15327906mbr3902\\_8](https://doi.org/10.1207/s15327906mbr3902_8)
- Levine, E. E., & Cohen, T. R. (2018). You can handle the truth: Mispredicting the consequences of honest communication. *Journal of Experimental Psychology: General, 147*, 1400-1429. <https://psycnet.apa.org/doi/10.1037/xge0000488>
- Loewenstein, G. (1996). Out of control: Visceral influences on behavior. *Organizational Behavior and Human Decision Processes, 65*, 272-292. <https://doi.org/10.1006/obhd.1996.0028>
- Marcus, B., Lee, K., & Ashton, M. C. (2007). Personality dimensions explaining relationships between integrity tests and counterproductive behavior: Big Five, or one in addition? *Personnel Psychology, 60*, 1-34. <https://doi.org/10.1111/j.1744-6570.2007.00063.x>
- Mazar, N., & Ariely, D. (2006). Dishonesty in everyday life and its policy implications. *Journal of Public Policy and Marketing, 25*, 117-126. <https://doi.org/10.1509%2Fjppm.25.1.117>
- McEvily, B., & Tortoriello, M. (2011). Measuring trust in organizational research: Review and recommendations. *Journal of Trust Research, 1*, 23-63. <https://doi.org/10.1080/21515581.2011.552424>
- McEvily, B., Radzevick, J. R., & Weber, R. A. (2012). Whom do you distrust and how much does it cost? An experiment on the measurement of trust. *Games and Economic Behavior, 74*, 285-298. doi:10.1016/j.geb.2011.06.011
- McLeish, K. N., & Oxoby, R. J. (2007). Measuring impatience: Elicited discount rates and the Barratt Impulsiveness Scale. *Personality and Individual Differences, 43*, 553-565. doi:10.1016/j.paid.2007.01.002
- Oh, I. -S., Lee, K., Ashton, M. C., & de Vries, R. E. (2011). Are dishonest extraverts more harmful than dishonest introverts? The interaction effects of Honesty-Humility and extraversion in predicting workplace deviance. *Applied Psychology: An International Review, 60*, 496–516. <https://doi.org/10.1111/j.1464-0597.2011.00445.x>
- Peeters, R., Vorsatz, M., & Walzl, M. (2008). Rewards in an experimental sender–receiver game. *Economics Letters, 101*, 148-150. doi:10.1016/j.econlet.2008.07.016
- Peterson, D. K. (2002). The relationship between unethical behavior and the dimensions of the ethical climate questionnaire. *Journal of Business Ethics, 41*, 313-326. <https://doi.org/10.1023/A:1021243117958>
- Reynolds, B., Ortengren, A., Richards, J. B., & de Wit, H. (2006). Dimensions of impulsive behavior: Personality and behavioral measures. *Personality and Individual Differences, 40*, 305-3015. <https://doi.org/10.1016/j.paid.2005.03.024>

- Rushton, J. P., Brainerd, C. J., & Pressley, M. (1983). Behavioral development and construct validity: The principle of aggregation. *Psychological Bulletin*, 94, 18-38. <https://psycnet.apa.org/doi/10.1037/0033-2909.94.1.18>
- Simpson, T. W. (2012). What is trust? *Pacific Philosophical Quarterly*, 93, 550-569. doi:10.1111/j.1468-0114.2012.01438.x
- Smedslund, J. (1997). *The structure of psychological common sense*. Lawrence Erlbaum Associates, Publishers.
- Sutter, M. (2009). Deception through telling the truth?! Experimental evidence from individuals and teams. *Economic Journal*, 119, 47-60. <https://doi.org/10.1111/j.1468-0297.2008.02205.x>
- Whiteside, S. P., Lynam, D. R. (2001). The Five Factor Model and impulsivity: Using a structural model of personality to understand impulsivity. *Personality and Individual Differences*, 30, 669-689. [https://doi.org/10.1016/S0191-8869\(00\)00064-7](https://doi.org/10.1016/S0191-8869(00)00064-7)
- Zak, P. J., & Knack, S. (2001). Trust and growth. *Economic Journal*, 111, 295-321. <https://doi.org/10.1111/1468-0297.00609>