Appendices for: "Truth-telling with a smartphone: The effect of communication media in strategic interactions"

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A1 Theoretical model

We provide a simple theoretical model that provides results consistent with our hypotheses. In their review of the literature Abeler et al. (2019) distinguish three basic explanations for lie aversion - lying costs, social conformity and reputation for honesty. In our context, given the payoff inter-dependence between marker and guesser, we also consider social-preferences over the final allocation of money. Specifically, suppose that a marker tosses the coin and finds that she is due a monetary payoff of w. She reports a payoff of r. Let g denote the payoff of the guesser. Note that 5 is the expected report if markers are honest (assuming 1 monetary payoff for each correct guess). We assume that the marker's utility function can be written:

$$U(r, w, g) = r - \alpha(r - w)^2 - \beta(r - 5)^2 + \gamma g \tag{1}$$

where $\alpha, \beta, \gamma \geq 0$ are individual and context specific parameters. The first term in the utility function is the direct monetary payoff, the second term captures an internalized cost from lying, the third term captures the reputation cost from dishonesty, and the fourth term social preferences.

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The most basic explanation for lie aversion is that dishonesty imposes some internalized cost on the individual, possibly because of injunctive norms about the 'right thing to do' (Bodner and Prelec, 2003; Bénabou and Tirole, 2004; Mazar et al., 2008; Thielmann and Hilbig, 2019). Here we assume this cost of lying is convex in the size of lie. A complementary explanation for lying aversion is social conformity. The idea being that an individual experiences a lower cost from lying if they expect others would also lie in this setting (Abeler et al., 2019). This puts more emphasis on descriptive rather than injunctive norms. We can capture this by assuming that α is decreasing in first-order beliefs on the likely report of others. A third explanation for lie aversion is the desire to maintain a reputation for honesty. The idea in this case being that an individual feels a stronger aversion to lying if she expects this will influence other's belief about her honesty. In equation (1) this is captured by the β term. The implicit assumption is that the more the reported payoff deviates from expected payoff the more likely it is the individual is perceived as dishonest. The final term in equation (1) represents social preferences through a form of altruism. In particular, the marker prefers, ceteris paribus, that the guesser would get a high payoff.

It is relatively straightforward to show that the optimal report of the marker (as a function of w) is given by:

$$r^* = \min\left[10, \text{nint}\left(\frac{1 + 2w\alpha + 10\beta + S\gamma}{2\alpha + 2\beta}\right)\right]$$

where S is an indicator variable that takes value $S = 1$ in the mutual-gain setting and $S = -1$ in the constant-sum setting, and nint is the nearest integer function. Figure A1 plots the optimal report, as a function of w, for four different combinations of α, β, γ. Part (a) shows a baseline of $\alpha = \beta = \gamma = 0.2$. In part (b) we increase α to 0.4 implying a higher internalised cost of lying. This results in a closer match between r^* and w. In part (c) we increase β to 0.4 implying a higher reputational cost. This means r^* becomes concentrated around the expected value of 5. Finally, in part (d) we increase γ to 0.4 implying a higher level of social-preference. This expands the difference between reporting in the constant-sum and mutual-gain settings.

We turn our attention now to the potential influence of the communication media. The communication media does not show up directly in r^* and so we look at the indirect effect the communication media may have on α, β and γ. We suggest that anonymity primarily impacts on the reputational cost of dishonesty. Conrads and Lotz (2015) find that reporting in a coin tossing task is increasing in the anonymity of the communication between subject and experimenter (see also Pascual-Ezama et al. (2015b); Hermann and

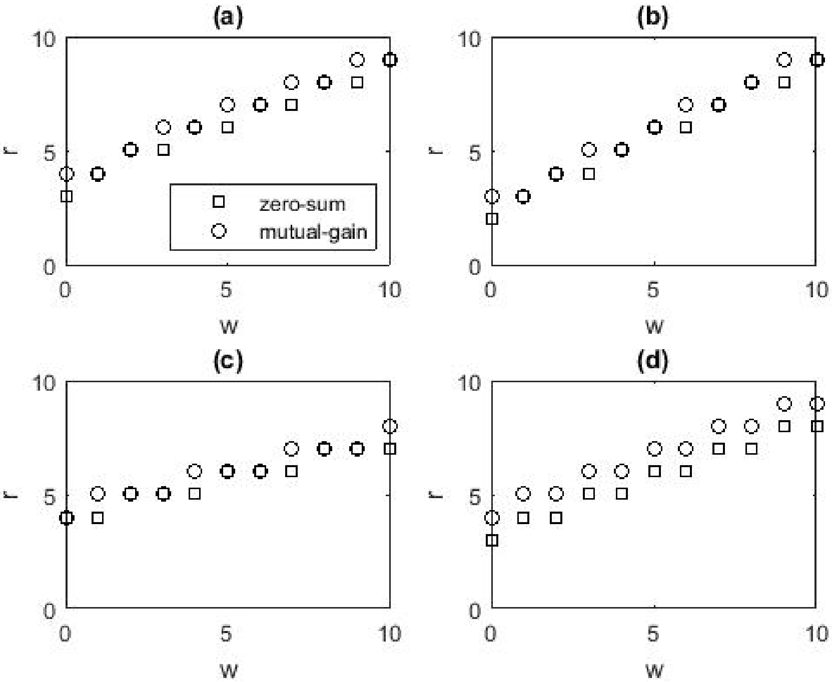

Figure A1: Optimal report as a function of guesses correct. (a) $\alpha = \beta = \gamma = 0.2$, (b) $\beta = \gamma = 0.2, \alpha = 0.4$, (c) $\alpha = \gamma = 0.2, \beta = 0.4$, (d) $\alpha = \beta = 0.2, \gamma = 0.4$

Ostermaier (2018)). Given that this is anonymity in communication (rather than the task itself) it points towards reputational concerns rather than an internalized cost of lying. We assume, therefore that β is an increasing function of anonymity. A number of studies connect anonymity with the cost of lying (Zhong et al., 2010; Kroher and Wolbring, 2015; Pascual-Ezama et al., 2015a; Schitter et al., 2019). We suggest that social distance primarily impacts on social-preferences. In particular, we know that closeness is associated with increased trust and cooperation (Hoffman et al., 1996; Buchan et al., 2006; Charness et al., 2007; Charness and Gneezy, 2008). There is evidence that interacting face-to-face increases honesty in a sender-receiver game (Van Zant and Kray, 2014). And also evidence of 'benevolent dishonesty' to benefit the poor (Okeke and Godlonton, 2014). We assume, therefore, that γ is an increasing function of the closeness between marker and guesser.

To motivate our hypotheses consider a simple dichotomous setting of high or low reputation concern, $\beta_H > \beta_L$, and high or low social preference, $\gamma_H > \gamma_L$. Consider the constant-sum treatments. To discern the impact of communication media we effectively need to compare

$$h^*_{Ph} = \frac{1 + 2w\alpha + 10\beta_L - \gamma_L}{2\alpha + 2\beta_L}, h^*_D = \frac{1 + 2w\alpha + 10\beta_L - \gamma_H}{2\alpha + 2\beta_L}, h^*_P = \frac{1 + 2w\alpha + 10\beta_H - \gamma_H}{2\alpha + 2\beta_H}$$

where h^*_{Ph}, h^*_D, h^*_P is the optimal report for Phone, Desktop and Paper respectively. It is trivial that $h^*_{Ph} > h^*_D$. It can be shown that $h^*_D > h^*_P$ if and only if $1+2w\alpha-\gamma_H > 10\alpha$. It will, thus, depend on the monetary payoff due and preferences. On aggregate, however, we expect $w = 5$ and so the condition reduces to $1 > \gamma_H$. This seems realistic (particularly at the aggregate level). We, thus, obtain $h^*_{Ph} > h^*_D > h^*_P$. Consistent with Hypothesis 1.

Next consider the mutual-gain treatments. We now need to compare

$$y^*_{Ph} = \frac{1+2w\alpha+10\beta_L+\gamma_L}{2\alpha+2\beta_L}, y^*_D = \frac{1+2w\alpha+10\beta_L+\gamma_H}{2\alpha+2\beta_L}, y^*_P = \frac{1+2w\alpha+10\beta_H+\gamma_H}{2\alpha+2\beta_H}$$

where y^*_{Ph}, y^*_D, y^*_P is the optimal report for Phone, Desktop and Paper respectively. It is trivial that $y^*_{Ph} < y^*_D$. It can be shown that $y^*_D > y^*_P$ if and only if $1+2w\alpha+\gamma_H > 10\alpha$. On aggregate, with $w = 5$ this holds. The comparison between Phone versus Paper is, as discussed in the main body of the paper, somewhat ambiguous. We get that $y^*_{Ph} > y^*_P$ if and only if

$$2(1+(2w-10)\alpha)(\beta_H-\beta_L)+2\beta_H\gamma_L > 2\alpha(\gamma_H-\gamma_L)+2\beta_L\gamma_H.$$

Setting $w = 5$ this reduces to

$$2(\beta_H-\beta_L)+2\beta_H\gamma_L > 2\alpha(\gamma_H-\gamma_L)+2\beta_L\gamma_H. \quad (2)$$

This may or may not hold depending on the parameter values. Given the mixed evidence on willingness to tell Pareto lies Cartwright et al. (2020) and the strong evidence on the importance of reputation in explaining variation in dishonesty Abeler et al. (2019), we consider it reasonable to assume: The change of communication media results in a bigger shift in reputational preferences than social preferences, i.e. $\beta_H - \beta_L \geq \gamma_H - \gamma_L$ and $\beta_H/\beta_L \geq \gamma_H/\gamma_L$. We would also expect α to be well below 1. Applying these assumptions in equation (2) gives $y^*_{Ph} > y^*_P$ consistent with Hypothesis 2.

Finally, we want to compare

$$\Delta_{Ph} = \frac{2\gamma_L}{2\alpha+2\beta_L}, \Delta_D = \frac{2\gamma_H}{2\alpha+2\beta_L}, \Delta_P = \frac{2\gamma_H}{2\alpha+2\beta_H}$$

where $\Delta_{Ph} = y^*_{Ph} - y^*_{Ph}$ etc. It is trivial that $\Delta_D > \Delta_{Ph}$ and $\Delta_D > \Delta_P$. This is consistent with Hypothesis 3. Comparing Δ_{Ph} and Δ_P we get $\Delta_{Ph} > \Delta_P$ if and only if

$$\alpha\gamma_L + \gamma_L\beta_H > \alpha\gamma_H + \gamma_H\beta_L.$$

Our assumption that $\beta_H/\beta_L \geq \gamma_H/\gamma_L$, together with $\gamma_H > \gamma_L$, suggest the net effect is ambiguous. We, thus, make no a-priori hypothesis on the relationship between Δ_{Ph} and Δ_P.

A2 Additional tables and figures

In this section, we provide results of individual heterogeneity as a function of payoff structures. Table A1 summarizes how four characteristics (experience in doing lab experiments, gender, single-child and egalitarian measure) are related to reported own payoff.

Table A1: Summary of tests comparing reported own payoff by individual characteristics

Subsample	Group	N	Mutual-gain	Constant-sum	*Effect Size*
Experience	Less than 5	116	6.52	6.27	0.55
	More than 5	113	7.22	6.13	0.66***
	Effect Size		0.40*	0.52	
Gender	Female	140	6.78	6.23	0.59**
	Male	89	6.83	6.12	0.60*
	Effect Size		0.51	0.51	
Single-child	Yes	123	6.78	6.40	0.56
	No	106	6.83	5.98	0.64**
	Effect Size		0.52	0.44	
Egalitarian	Yes	92	6.63	6.12	0.57
	No	137	6.94	6.23	0.62**
	Effect Size		0.57	0.52	

Notes: Significance levels are derived from Mann-Whitney tests:* indicates $p < 0.1$; ** $p < 0.05$; ***$p < 0.01$.

We find that prior experience in economic experiments has a significant effect on reported own payoffs. Specifically, subjects who have participated in 5 or more experiments show more dishonesty in the mutual-gain setting than constant-sum setting ($p = .003$, MWW). This finding seems consistent with Schmidt et al. (2020) who find experienced subjects to focus more on efficiency and own payoff. We also find that those who are not a single child are more dishonest in the mutual-gain setting ($p = 0.02$).[1] We conjecture

[1] The one-child policy was initiated in China from the late 1970s until 2016. Our subjects are mostly undergraduate students (mean age: 20.3) who were born under the influence of this policy. In the experiment, 53.7% of our subjects are single-child.

that those who are not a single child may have a higher concern for others. This finding is consistent with Cameron et al. (2013)'s analysis of social preference change after China's one-child policy (OCP).

Prior studies have found notable gender differences in dishonesty (Houser et al., 2016) and social preferences (Sutter et al., 2018). It is, therefore, interesting to observe that we find no gender effect in our experiment. Indeed not only do we not observe any statistically significant differences, but the differences in reported payoffs are essentially non-existent, see Table A1. In a meta-analysis Gerlach et al. (2019) found a statistically significant gender effect, although the economic difference is arguably small. Similarly, Capraro (2018) in a meta-analysis of sender-receiver games finds a statistically significant gender effect, although not for the kind of Pareto lies relevant to our mutual-gain setting. The role of gender in dishonesty appears, therefore, subtle (Azar and Applebaum, 2020).

The equality equivalent test asks subjects to make four allocation decisions between themselves and another (Bartling et al., 2009). In each decision the subject can choose an equal option, where both get 10 Yuan, or unequal outcomes, where for instance the subject gets 10 Yuan and the other person gets 18 Yuan. A subject who chooses the equal option for all four decisions is classified as egalitarian. You can see in Table A1 that subjects who have egalitarian preferences do not exhibit significantly more dishonesty in the mutual-gain setting while those who are not egalitarian do ($p = .012$).

A3 Experimental Instructions

The original instructions are in Chinese. All instructions and questionnaires presented here are double-translated.

Experiment Instructions

Thank you for agreeing to take part in this experiment based on economic decision-making. Below are the instructions for carrying out the experiment; please read through them carefully and do not communicate with any of the other subjects. If you have any questions, please ask one of the experimenters.

You have been paired with another subject in this room.

This part of the experiment consists of two tasks. In the first task, you will be a "Guesser" and the other subject will be a "Marker". In the second task you will be a "Marker" and the other subject will be a "Guesser".

Task of the Guesser

- You have been given an answer sheet. In the column marked HEADS or TAILS you must write HEADS or TAILS for each of the 10 guesses.
- You can guess whatever you like for each guess but please write clearly.
- Once you have made your ten guesses the sheet will be passed on to the Marker.

Task of the Marker

- You will receive the answer sheet of the Guesser.
- You need to flip a coin 10 times and record whether the Guesser correctly guessed the flip of each coin. You should record this on the answer sheet in the column provided.
- The payoff that you and the Guesser receive is then determined as detailed on the answer sheet. Please fill in the columns for Guesser payoff and Marker payoff recording the respective payoffs for each guess.

In each task, you will get the total corresponding earnings from the 10 guesses.

At the end of the experiment, one of the tasks will be randomly selected to determine your final payoff.

Once you have read through and understood the instructions please wait for your experimenter for further instructions. If you have any questions, then please raise your hand and wait for someone to come to you.

A4 Post-experiment questionnaires

Equality Equivalent Test (EET)

In this task you have the opportunity to earn additional amount of money. The amount you receive depends on your choice or the choice of the other subject who is matched with you in this room.

In the following four decisions, you are asked to decide between two alternatives which are referred to as “Left” and “Right”. Each alternative implies additional earnings for you and the other person.

At the end of the experiment, half of the subjects will be randomly selected as making payoff relevant decisions. That is the choice of these subjects will determine their own payoff and the payoff of the other subjects matched with them. Among the 4 decisions of the payoff relevant choices, one will be paid for real.

Your Decisions

Option 'Left'				Option 'Right'	
Your Payoff	Other's Payoff			Your Payoff	Other's Payoff
10Yuan	10Yuan	☐	☐	10Yuan	6Yuan
10Yuan	10Yuan	☐	☐	16Yuan	4Yuan
10Yuan	10Yuan	☐	☐	10Yuan	18Yuan
10Yuan	10Yuan	☐	☐	11Yuan	19Yuan

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