Ways to measure honesty: a new experiment and two questionnaires

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Abstract

I report on the validity of different measures of honest behaviour. Subjects from 15 countries took part in two web-based experiments: a coin flip with a reward for reporting "heads", and a quiz with the possibility of cheating. Participants also answered questions on moral attitudes, and on unethical real world behaviour. Honesty in the two experiments was correlated, and correlated with self-reports of behaviour. Answers to the attitudes questions did not correlate with the experimental measures or self-reported behaviour. The quiz experiment provides a useful way to measure individual honesty in an online setting.

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Trustworthy, honest behaviour can make markets and other social interactions more efficient (Arrow, 1972). As a result, economists have become interested in the causes of honest behaviour (Gneezy, 2005; Charness and Dufwenberg, 2006; Vanberg, 2008; Mazar, Amir, and Ariely, 2008; Lundquist et al., 2009; Erat and Gneezy, 2012; Fischbacher and Föllmi-Heusi, 2013). A common experimental paradigm for measuring honest behaviour is to have subjects privately roll a die, flip a coin, etc. and report the outcome. Their payment is determined by the number of the roll or whether the coin came up heads. A subject can then gain by untruthfully reporting a high-paying outcome. Individual decisions to lie or tell the truth stay private; dishonesty is detected statistically in the aggregate, by comparing the distribution of reports with the distribution of the underlying event. These paradigms are simple to implement, but involve unusual and counter-intuitive instructions to subjects. There is a risk that subjects' honesty might be confounded with compliance with experimenter instructions. Or honest behaviour in the experiment might fail to predict honest behaviour in real world situations.[1] For this reason, new experiments could be useful as alternatives to the coin flip.

Perhaps honesty can also be measured by asking people questions. Psychologists have developed questionnaires to elicit the principles behind respondents' moral judgments (Graham, Haidt, and Nosek, 2009); the World Values Survey and others include questions on social trust (Association, 2009). Economists are wary of unincentivized questions, and when asking people about their honesty, the reasons for skepticism are extra obvious. Nevertheless, it is an empirical question whether questionnaires can predict honest behaviour. This is worth investigating, because they could provide a cheap and simple measurement tool.

To shed light on these issues, I report my research on a web-based panel of people from 15 countries. Findings on cross-country differences in honesty will be reported elsewhere; this paper focuses on methodological issues. Participants took part in two experiments: a coin flip experiment, and a quiz experiment designed to measure honesty in a more natural way. They also answered questions on their moral attitudes, including their attitude to lying, and some respondents were asked to report episodes of previous unethical behaviour. Honesty in the quiz experiment correlates with honesty in the coin flip. Answers to moral judgment questions fail to predict dishonesty in either experiment, but self-reports of unethical behaviour do so in both. Lastly, I test whether incentive sizes affect honesty and find no evidence that they do so in any country.

Design

Participants were recruited from web-based panels (provided by Qualtrics) in two waves. The first wave consisted of 799 respondents from eight countries: Brazil, China, Greece, Japan, Russia, Switzerland, Turkey, and the United States. The second wave added 732 respondents from seven more countries: Argentina, Denmark, Great Britain, India, Korea, Portugal, South Africa and Turkey. Quota sampling en-

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[1]Villeval (2015) finds that the coin flip paradigm predicts dishonesty in a field setting.

sured an equal number of males and females, and equal numbers in each of four age groups. While the country samples are not statistically representative, they are thus more demographically diverse than most laboratory samples.

Subjects took part in two different experiments. In the *coin flip* experiment, they were asked to get a coin ready and had to confirm they had done this. On the next screen, they were asked to flip the coin and report the result. They were told that they would receive a money incentive if they reported "heads". In the *quiz* experiment, subjects were given a six-question open-ended test on the topic of music. They were asked not to look up the answers on the internet, and they had to tick a box confirming they had answered on their own before moving on. The questions were:

1. Who wrote the composition "Für Elise"?

2. What is Lady Gaga's real first name?

3. Name the drummer of the rock group Nirvana.

4. In what year was Claude Debussy born?

5. How many valves are there on a standard modern trumpet?

6. Name the town and state of the US where Michael Jackson was born.

Questions 2, 4 and 6 were designed to be very difficult for almost anyone to answer, but very easy to look up online: they can be answered, in any of the quiz countries and languages, by typing "Lady Gaga", "Debussy" or "Michael Jackson" into Google. (Google is not widely used in China, but other search engines give equally easy access to these answers.) Respondents were offered a money incentive if they answered *all* the questions correctly. Since the survey was web-based, they could cheat by looking up answers online, and untruthfully tick the checkbox to affirm they had not done so. [2]

The quiz experiment resembles a situation which many people have experienced: the ability to cheat on a test or exam. Although the topic is arbitrary, completing a quiz for a prize is probably more a more natural request than flipping a coin for a prize. If so, this ought to reduce experimenter demand and compliance effects. The paradigm is also simple to implement in an online subject pool, which is an increasingly popular setting for experimental research. Lastly, so long as some questions can only be answered right by cheating, dishonesty can be observed at individual level. On the downside, "hard" questions must be chosen carefully so that they are unlikely to be answered correctly without cheating, and the ease of cheating could depend on subjects' internet search skills.

Previous experimental work has examined whether lying is increased by larger monetary incentives (Mazar, Amir, and Ariely, 2008; Hurkens and Kartik, 2009; Gibson, Tanner, and Wagner, 2013; Gneezy, Rockenbach, and Serra-Garcia, 2013). This is important both theoretically for understanding how "lying aversion" works, and methodologically for comparative research, since it may be hard to hold the size of

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[2]Mazar, Amir, and Ariely (2008) used a maths quiz with the opportunity to cheat, and observed cheating in the aggregate by comparing average scores when cheating was and was not possible. The paradigm here relies on some questions being intrinsically hard to get right without cheating. I check this assumption below.

money incentives constant across countries. Randomized treatments varied the incentive size. In the HIGH treatment, $5 was paid for reporting heads in the coin flip and $5 was paid for getting all quiz questions right. In the LOW treatment, each payment was $3. For a comparison, a Big Mac cost between $1.83 (India) and $6.82 (Switzerland) among the target countries in July 2015 (The Economist, 2014).

The coin flip and quiz were presented in random order. After both experiments, subjects answered a 15 question integrity test taken from Whiteley (2012). This asks participants to rate whether 15 actions are "always", "sometimes", "rarely" or "never" justified. Typical actions include "making up things on a job application" and "driving faster than the speed limit". Next, subjects' beliefs were elicited on the behaviour of other countries' residents in the coin flip experiment. The experiment finished with demographic questions. In the second wave, respondents were also asked whether they had taken four ethically questionable actions in the past 12 months:

1. Avoiding a fare on public transport

2. Calling in sick when not actually unwell

3. Making something up on a job application

4. Downloading music or videos without paying for them.

Participants were balanced by gender and across four age groups within each country. The HIGH/LOW treatments, and the order of the experiments, were also balanced within countries. Payments were passed to respondents by Qualtrics in addition to its standard payment, and by the same mechanism.

Results

Result 1: subjects who reported heads in the coin flip scored higher on hard quiz questions

Figure 1 shows the proportion reporting 'heads' grouped by total score on the hard quiz questions 2, 4 and 6 (henceforth "quiz scores"). The median quiz scores were 2 and 0.5 for those reporting heads and tails respectively (Mann-Whitney $p = 3.43 \times 10^{-7}$).[3] Honest behaviour in the coin flip results in a report of heads 50% of the time on average, and dishonest behaviour results in heads 100% of the time, so if X% of a group reports heads, the group's estimated level of dishonesty is 2(X - 50)%. By this method, an estimated 25.27% of subjects scoring 0 out of 3 on the hard questions lied about the coin flip; of those scoring 3 out of 3, 54.07% lied.

It might be that those who scored highly on hard questions simply knew the answers, and that this correlated with dishonesty in the coin flip. To check this, the quiz was administered, with the same incentives, to a different sample of 144 subjects, in a laboratory where looking up the answers online was extremely difficult and would

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[3]There are also significant correlations with scores on the whole quiz (medians 3 and 2 for heads- and tails-reporters respectively, Mann-Whitney $p = 1.4 \times 10^{-6}$), and with the proportion achieving a perfect score (23.47% and 14.37% respectively, chi-squared test $p = 5.54 \times 10^{-5}$).
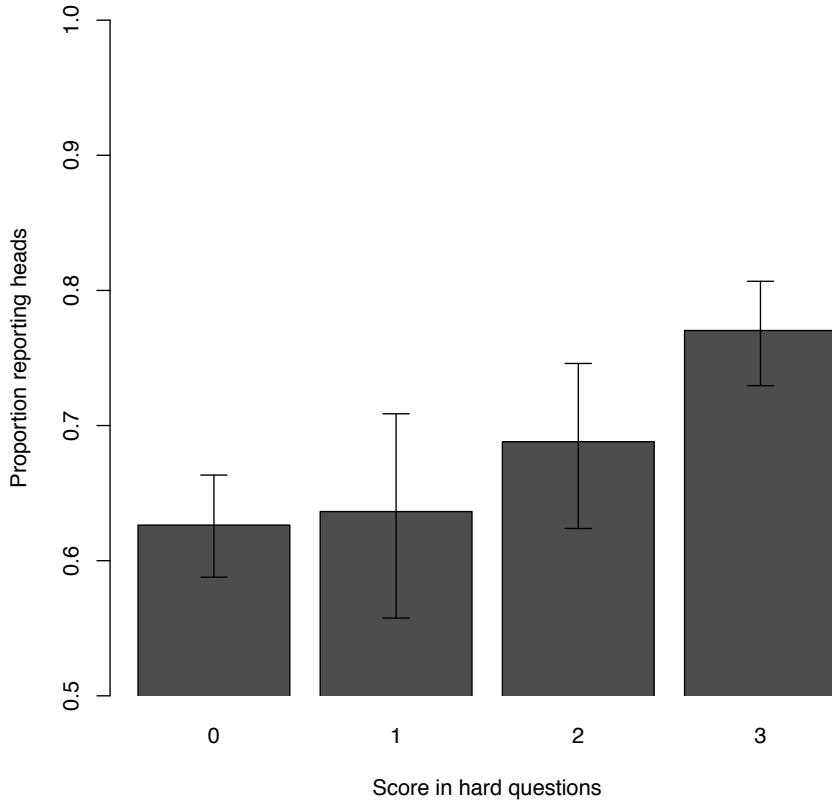
Figure 1: Quiz scores on hard questions versus coin flip reports. 95% c.i.'s shown

be punished by removal from the experiment. Questions 4 and 6 were extremely difficult, as predicted. 142 subjects out of 144 failed to answer either of them correctly. Subjects did better on question 2, with 25 out of 144 answering correctly (this mainly student sample was unexpectedly well-informed about Lady Gaga). Thus, without the possibility of cheating, a score above 1 on hard questions was almost unachievable.

Result 2: subjects who expressed less ethical attitudes *did not* behave less honestly in the experiments

Following Whiteley (2012), a moral integrity score was created by summing answers to all 15 questions from the integrity test, ranging from 4 ("never justified") to 1 ("always justified").[4] Mean integrity scores for those reporting heads and tails were 50.82 and

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[4]"Straightliners" who gave the same answer for every question were removed from the analysis.

51.53 respectively. This is marginally significant in one specification (t test $p = 0.07$; Mann-Whitney $p = 0.53$). The difference is small – about one-seventh of a standard deviation. The correlation with quiz scores was small and insignificant (Spearman's $\rho = 0.03$; $p = 0.31$).

While the integrity test included questions not directly about dishonesty, one question asked whether "lying in your own interest" was justifiable. But this also was not a useful predictor of behaviour. Proportions reporting heads were 91.3%, 65.02%, 65.6% and 65.25% among those who said lying was "always", "sometimes", "rarely" and "never" justified respectively (chi-squared test $p = 0.08$). However, the first group contained only 38 respondents, so for the vast majority of subjects this question did not predict honesty in the coin flip. There was also no correlation with quiz scores (Spearman's $\rho = 0.02$, $p = 0.49$).

Result 3: subjects who reported more unethical behaviours *did* behave less honestly in the experiments

Second wave subjects were asked whether they had taken any of four unethical actions in the past 12 months. 601 out of 732 subjects reported only zero or one unethical action(s). Figure 2 plots behaviour in the experiments, grouped by the number of unethical actions reported. Those who reported heads admitted to significantly more unethical actions (mean 0.85 versus 0.6, Mann-Whitney test $p = 0$). Number of actions reported also correlated with higher quiz scores (Spearman's $\rho = 0.1$; $p = 0.01$).

Result 4: incentive size did not affect lying

Proportions reporting heads were almost identical between HIGH and LOW incentive treatments (HIGH: 0.67, LOW 0.69, chi-squared test $p = 0.6$). So were mean quiz scores (HIGH: 1.32, LOW: 1.39, Mann-Whitney test $p = 0.27$). The 95% confidence interval for the effect of the incentive on proportions reporting heads, from a t test, is -0.03 to 0.06. This is not a strong test of the broad hypothesis that lying responds to incentives, since the difference in payment was only $2, but it shows that changes in incentives comparable to cross-country differences in purchasing power have little effect.

Cross-country robustness

As most research does not use a cross-national sample, I also checked whether these results held within individual countries. Table 1 shows associations among the different measures in each country. Since the per-country N is low, I focus more on measures of absolute size than on significance, but report significance using stars. Overall, the pattern of the results holds when we look within countries. The quiz score and coin flip are positively associated in 12 out of 15 countries, often significantly so. The integrity test score only has the expected direction of associated with the experiments in about half the countries, and is rarely significant. The questionnaire measure of unethical actions is positively associated with each experiment in most of the 7 second wave countries.
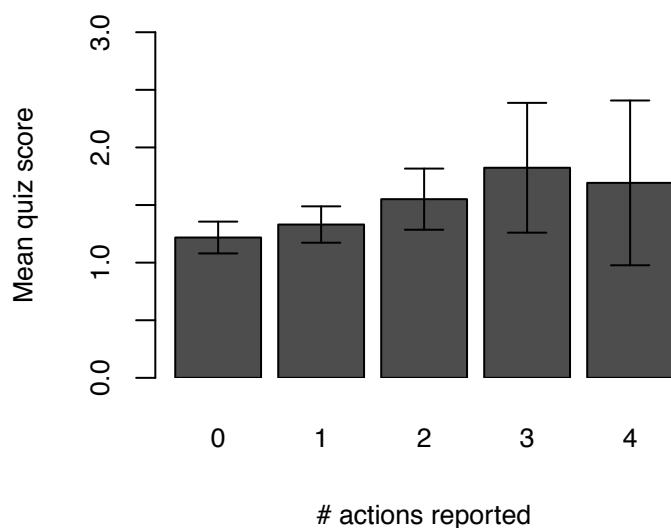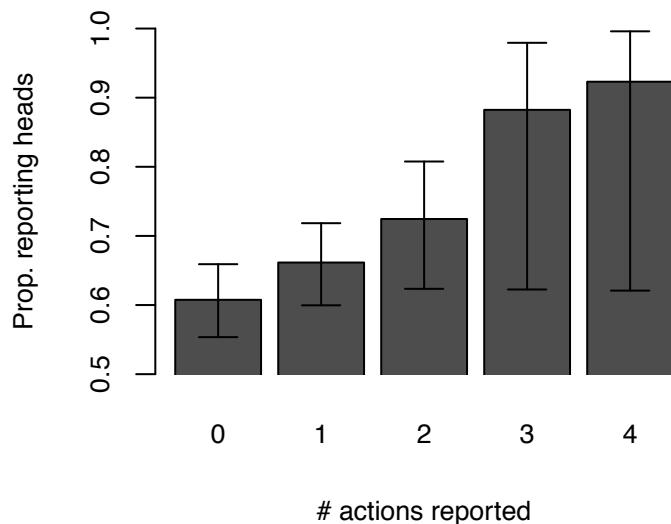
Figure 2: Experimental behaviour by number of unethical actions reported. 95% c.i.'s shown

Country	Q/F	I/F	I/Q	A/F	A/Q	A/I	$/F	$/Q
All	0.37 ***	-0.71 .	0.021				-1.4	-0.067
BR	-0.032	0.58	0.047				-19 .	-0.22
CH	0.31	-0.72	0.0087				-7.3	0.032
CN	0.97 *	1	0.066				-1.8	0.68 *
GR	0.57 *	1.1	0.11				8.5	-0.0053
JP	0.5 .	-6.4 ***	0.073				-5.6	-0.2
RU	0.43	0.3	-0.065				-8.8	0.084
TR	0.16	0.42	-0.15				11	-0.2
US	-0.17	-1.3	-0.088				17 .	-0.082
AR	0.77 **	-2.2	0.002	-0.081	-0.019	-0.26 *	-5	-0.41 .
DK	0.66 *	-0.021	-0.072	0.32 *	0.11	-0.36 **	11	-0.013
GB	-0.032	-4.1 **	0.079	0.6 **	0.12	-0.35 **	-3.7	-0.054
IN	0.15	-3.8 .	-0.14	0.14	0.13	-0.44 ***	-8.4	-0.34
KR	0.81 **	2.3	-5.9e-06	0.089	-0.068	-0.14	-11	-0.24
PT	0.49 *	0.99	0.08	0.19	0.035	-0.29 *	8.6	-0.048
ZA	0.15	0.033	-0.1	0.34 .	0.26 **	-0.34 **	-16	-0.096
N exp. dir.	12/15	7/15	8/15	6/7	5/7	7/7	5/15	3/15

Table 1: Cross-country measures of association
Q/F: mean quiz score for heads reporters minus mean for tails reporters (Mann-Whitney test)
I/F: mean integrity score, heads reporters minus tails reporters (t test)
I/Q: Spearman's ρ, quiz score and integrity score
A/F: mean unethical actions reported, heads reporters minus tails reporters (Mann-Whitney test)
A/Q: Spearman's ρ, unethical actions and quiz score
A/I: Spearman's ρ, unethical actions and integrity score
$/F: per cent reporting heads, $5 incentive minus $3 incentive (chi-squared test)
$/F: mean quiz score, $5 incentive minus $3 incentive (Mann-Whitney test)
N exp. dir.: number of associations with expected sign
. $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

There is a reliably significant negative correlation between integrity test score and the number of unethical actions reported. This is a surprise, given that the integrity score fails to predict honesty in the experiments. Possibly, the correlation is driven by honesty in questionnaire reporting: some subjects honestly report their own unethical actions and low moral standards, others are more consistent and lie about their own dishonesty.

Finally, the non-effect of incentives is robust, in both quiz and coin flip: in most countries, effects have the wrong sign.

Conclusion

Measuring honesty is an important empirical challenge. An important criterion for good measurement is *convergent validity*: measures which claim to deal with the same construct should be correlated. These results provide convergent validity for both quiz and coin flip experiments. The quiz paradigm described here is similar to a well-known real-world moral dilemma. This makes it potentially useful when experimental realism

is important. It is also well suited to web-based interfaces. Lastly, unlike the coin flip experiment, it allows the accurate detection of dishonesty at individual level.

It is an empirical question whether questionnaires can predict moral behaviour. The integrity test used here did not. I stress that research on moral attitudes has independent importance, since they may affect society in other ways than by changing the attitude holder's behaviour, for example, by creating expectations about how others will or should behave. However, to predict dishonest behaviour, questions on previous unethical actions appear to work better.[5] Researchers planning surveys on honesty should consider this approach.

Acknowledgements

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[5]Similarly, Glaeser et al. (2000) find that questions on past actions predict behavioural trust better than attitudinal questions.

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Supplementary material: experiment instructions

In the next part of the survey, you will be asked to make some decisions. The decisions you make will affect the amount of money that you receive.

You do not have to fill in this part of the survey if you do not want to: in this case, simply leave responses blank. Data from this part of the survey will be stored at the University of Essex and may be released to other researchers. However, this data will not include your name or any other information that could identify you.

I consent to taking part in this part of the survey [ ]

What is your gender?

[ ] Male [ ] Female

How old are you?

[ ] Under 18 [ ] 18-24 [ ] 25-34 [ ] 35-44 [ ] 45-54 [ ] 55 or over

In which country do you reside? ...

Below is a short quiz on the topic of music. We will pay you $INCENTIVE extra if you get all the questions right. This payment will be added to your standard payment for taking the survey. Please answer the questions on your own, without looking them up elsewhere.

Who wrote the composition "Für Elise"?

What is Lady Gaga's real first name?___

Name the drummer of the rock group Nirvana.___

In what year was Claude Debussy born?___

How many valves are there on a standard modern trumpet?___

Name the town and state of the US where Michael Jackson was born.___

I confirm that I answered the quiz on my own, and that I did not look up any answers.
[ ]

On the next page you will need to flip a coin.

Please get a coin ready before moving on!

OK, I have a coin ready [ ]

Please now flip the coin. If the coin lands on "heads", we will pay you an extra $INCENTIVE.

This payment will be added to your standard payment for taking the survey.

Did the coin land on heads?

[ ] Yes [ ] No

Please think about each of the following actions. In your opinion, is the action always justified, sometimes justified, rarely justified or never justified?

Always justified [ ] Sometimes justified [ ] Rarely justified [ ] Never justified [ ] Don't know [ ]

Claiming government benefits to which you are not entitled

Buying something which you know is stolen

Taking cannabis

Keeping money that you found in the street

11

Lying in your own interests
Having an affair when you are married
Having sex under the legal age of consent
Failing to report accidental damage you've done to a parked vehicle
Throwing away litter in a public place
Driving under the influence of alcohol
Avoiding a fare on public transport
Cheating on taxes if you have a chance
Someone accepting a bribe in the course of their duties
Driving faster than the speed limit
Making up things on a job application

Some people from RANDOM COUNTRY are answering this questionnaire.
Think back to the coin flip question. People from RANDOM COUNTRY were paid approximately the same amount as you if they flipped heads.
What percentage (%) of people from RANDOM COUNTRY do you think will report that the coin landed on heads?___
[If in INCENTIVIZED GUESS treatment] *We will pay you an extra 2$ if your answer is within 10% of the correct percentage.*

[Only for second wave countries]
Please enter your nationality:___
Do you attend religious services?
[ ] Yes, at least weekly [ ] Yes, sometimes [ ] No, never
Please indicate your marital status:
[ ] Single [ ] Married [ ] Separated [ ] Divorced [ ] Widowed
How many children do you have (including step-children)?
[ ] 0 [ ] 1 [ ] 2 [ ] 3 [ ] 4 or more
What is your total monthly income (from all sources, net of tax)?___
Is religion an important part of your life?
[ ] Yes, very important [ ] Yes, quite important [ ] No, not important [ ] I have no religion
At what age did you complete your education?
[ ] Under 16 [ ] 16 [ ] 17 [ ] 18 [ ] 19 [ ] 20 [ ] 21 or over [ ] I have not yet completed my education
Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?
[ ] Most people can be trusted [ ] You need to be very careful
Which of these things, if any, have you done in the past 12 months?
[ ] Done in past year [ ] Not done in past year
Avoided a fare on public transport
Made something up on a job application
Downloaded music or videos without paying for them
Called in sick to work when not actually unwell

Supplementary material: descriptive statistics

Variable	Levels	n	%
Country	AR	105	6.9
	BR	100	6.5
	CH	99	6.5
	CN	100	6.5
	DK	105	6.9
	GB	104	6.8
	GR	103	6.7
	IN	105	6.9
	JP	101	6.6
	KR	104	6.8
	PT	104	6.8
	RU	100	6.5
	TR	96	6.3
	US	100	6.5
	ZA	105	6.9
	all	1531	100.0
Age	18-24	306	20.0
	25-34	314	20.5
	35-44	308	20.1
	54-54	309	20.2
	55+	294	19.2
	all	1531	100.0
Gender	Female	764	50.0
	Male	764	50.0
	all	1528	100.0
ReligAttend	Never	598	39.2
	Sometimes	693	45.4
	Weekly	236	15.5
	all	1527	100.0
Heads	Heads	1044	68.2
	Tails	487	31.8
	all	1531	100.0
QuizScore	0	653	42.6
	1	165	10.8
	2	234	15.3
	3	479	31.3
	all	1531	100.0
Integrity	(15,20]	9	0.6
	(20,25]	10	0.7
	(25,30]	12	0.8
	(30,35]	22	1.5
	(35,40]	53	3.5
	(40,45]	125	8.3
	(45,50]	290	19.3
	(50,55]	442	29.4
	(55,60]	539	35.9
	all	1502	100.0

Table 2: Descriptive statistics

Variable	Levels	n	%
UnethicalActions	0	344	47.2
	1	257	35.2
	2	98	13.4
	3	17	2.3
	4	13	1.8
	all	729	100.0
MaritalStatus	Single	310	42.4
	Married	344	47.1
	Sep.	13	1.8
	Div.	49	6.7
	Wid.	15	2.0
	all	731	100.0
Children	0	293	40.1
	1	143	19.6
	2	193	26.4
	3	56	7.7
	4+	46	6.3
	all	731	100.0
AgeLeftEducation	16	37	5.0
	17	40	5.5
	18	83	11.3
	19	47	6.4
	20	54	7.4
	21+	357	48.8
	Still in education	103	14.1
	Under 16	11	1.5
	all	732	100.0
ImportanceOfReligion	No religion	156	21.4
	Not important	189	25.9
	Quite important	223	30.6
	Very important	161	22.1
	all	729	100.0
Trust	Most people can be trusted	241	33.1
	You need to be very careful	487	66.9
	all	728	100.0

Table 3: Descriptive statistics (wave 2 demographics)