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Bias in the Relative Assessment of Happiness, Political Stance, Height and Weight

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Bias in the Relative Assessment of Happiness, Political Stance, Height and Weight

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Abstract

Cognitive biases have been a recognised feature of research into human behaviour since at least Kahneman and Tversky's ground-breaking work of the 1970s. We find that such biases extend into the realm of perceptions about relative happiness and we compare and contrast this phenomenon across three other characteristics: height, weight and political stance. Our findings indicate a powerful and consistent bias in the way individuals perceive their place in the population distribution. In particular, those at extremes perceive a population distribution that is incorrectly and heavily biased towards themselves, irrespective of whether the characteristic is objective and easily observed or not.

Keywords: bias, beliefs, estimating distributions, happiness, political stance, height, weight.

JEL Classification: D03, C83, D84.

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Introduction

Within the social sciences individuals are often modelled as a collective of personal characteristics, from the objective and observable (height, weight), through the subjective and unobservable (political stance, happiness). Although the concept of a linear happiness scale has been used for many years in high-profile surveys (such as the British Household Panel Survey) and in many well-cited papers[2], there has been intense debate[3] concerning whether happiness really is uni-dimensional, and whether individuals can report underlying happiness correctly and consistently. Similar caveats also apply to the notion of a political spectrum from extreme left to extreme right, yet this is nevertheless a much-used phenomenon in both popular perception and research, for instance in the modelling of public choices in probabilistic voting theory where individuals have ideological preferences over a uni-dimensional line in Lindbeck and Weibull (1987). In a series of experiments we were able to compare the capacity of individuals to estimate their relative position in a population of their peers across these four characteristics, with a particular emphasis on relative happiness. We found that individuals suffer from a dramatic bias across all four and we are the first to show it in self-reported happiness: the more extreme a person's own position in the distribution the more likely they are to believe the distribution is biased towards their own position. Accuracy increases for objective characteristics (height, weight) though bias is still present. To highlight two implications, extremist voters are more likely to think that a greater fraction of the population share their views than warranted, and happier individuals may overestimate those who share their contentment. This might explain how extremists might believe that discontentment is rife when it is not (or the reverse), or claim to be more representative than they are.

To place our work in context, our findings support recent theoretical work[1] on the ability of individuals to delude themselves into taking on incorrect beliefs which are self-beneficial. The most similar recent empirical work to our own, Oswald (2008), was based on individuals' perceived and real height and showed that individuals' reporting function from reality to feelings is concave. More generally, our work complements the research on cognitive biases following Kahneman and Tversky (1974).

Methodology

Our data was collected using a questionnaire (provided in the Appendix) presented in a controlled experiment at the University of Warwick in 8 sessions conducted on 17 March, 5 May and 11 May, 2010. The participants were 120 undergraduates (approximately 15 per session). Subjects received £5 show-up fee, and no subject was allowed to participate more than once.

[2] For examples, see Di Tella et al (2001), Easterlin (2001) and Layard (2008).
[3] See Kreuger and Schkade (2008) and Lucas et al (2008).

Prior to the questionnaire the students were asked to vote in mock elections in which they were given a preference ordering and information about the preferences of the other participants before voting. One round was chosen as the payment round (randomly and without prior warning) and subjects were given an explicit payment rate of £15 if their first preference candidate won, £5 for their second preference and nothing if their third and final preference won. The payment was designed to incentivize the participants into thinking seriously about their own preferences and those of their fellow participants which we hoped would follow-through to the questionnaire phase.

The variable "Happiness" is measured from 1 (completely sad) to 7 (completely happy). "Political stance" is also measured from 1 (extreme left) to 7 (extreme right). "Less happy" is the answer to the question: "what percentage of students at Warwick do you think are less happy than you are?", "More left" is the answer to the question: "What percentage of students at Warwick do you think are more left-wing than you?" and "Lighter"[resp. "Shorter"] to the question "what percentage of students (male or female) do you think are lighter [resp. shorter] than you?" Summary statistics are presented in Table 1 in the Appendix.

Results

Figure 1 plots the actual and predicted cumulative distribution functions. In order to facilitate the comparison we rounded the height and weight to the closest decile. Individuals with low values tend to overestimate the number of individuals below, and high value individuals overestimate the number of individuals above. For example, heavier-than-average individuals seem to think that the distribution is skewed towards heavier individuals.

Figure 2 shows the plot of the perceived position of each subject with respect to his or her happiness, political stance, weight and height against reality. In all cases there is a clear positive relationship. Understandably, there is more noise in the predictions of the non-observable characteristics happiness and political stance. However, across all characteristics, individuals seem to exhibit a systematic bias. Regression lines predicting happiness, political stance, weight and height distributions are in general less steep than they should be with correct estimates, and, aside from the measure of political stance, there is a clear constant. In the case of political stance, the line that best approximates the relationship seems both s-shaped (concave then convex), and asymmetric (intersecting the diagonal below 0.5). From an inspection of Figure 1 individuals seem to predict the distribution of the more left-wing individuals better than the distribution of the more right-wing individuals. Figure 3 plots the errors made by individuals, and we note a generally similar structure: individuals reporting low (resp. high) numbers in

every metric overestimate the preponderance of individuals with similarly low (resp. high) numbers. Individuals tend to think others are more like themselves than is warranted.

We then postulated a model of the form:

$$err_i^t = \hat{p}_i^t - p_i^t \text{ for each } t = \{happiness, political\ stance, height, weight\} \quad (1)$$

which measures the deviation of predictions from reality. The data reveals that the (squared) errors in the happiness distribution prediction are not statistically different from those in the political views distribution, and they are both significantly larger than the (squared) errors relating to height and weight (which are not significantly different from each other). Table 2 in the Appendix reports the deviation of the squared errors from the correct model, and Table 3 reports a two sample t-test comparing the different squared errors.

The clear positive correlation between perceived and real distribution visible in Figure 2 is not a sufficient test that individuals are predicting correctly since even with capacity to predict correctly the cumulative distribution would be, by construction, increasing in the happiness level, and therefore positively correlated with the true distribution. We can capture the notion of random predictions by modelling individuals as thinking that other individuals report a number from 1 to 7, drawn from a uniform distribution which generates a cumulative distribution *(happiness − 1) / 7*. Therefore, we defined the variable:

$$p_i^{random} = \frac{happiness_i}{7} - \frac{1}{7} \quad (2)$$

and calculated the error $\left(\hat{p}_i^{happiness} - p_i^{random}\right)^2$, whose summary statistics are in Table 4 in the Appendix. Using this variable we can see how far removed predictions are from those randomly drawn from a uniform distribution. In fact, subjects do much better than this: a t-test does not reject the hypothesis that $\left(\hat{p}_i^{happiness} - p_i^{random}\right)^2 > \left(\hat{p}_i^{happiness} - p_i^{happiness}\right)^2$ (p-value 0.975), while it does reject the hypothesis that $\left(\hat{p}_i^{happiness} - p_i^{random}\right)^2 = \left(\hat{p}_i^{happiness} - p_i^{happiness}\right)^2$ (p-value 0.0493).

While it seems that individuals make significant departures from the "correct" distribution and these errors are similar for happiness and political stance, we undertook further analysis to distinguish between errors that are systematic across all individuals and idiosyncratic between individuals. From Figure 2 it seems evident that individuals commit systematic errors when they predict the distributions of the different characteristics. From a visual inspection of Figure 1, we assume a linear model for the happiness, weight and height distribution of the form:

$$\hat{p}_i^t = \alpha^t + \beta_t p_i^t + \varepsilon_i^t \quad (3)$$

and a cubic model for political stance:

$$\hat{p}_i = \alpha + \beta_1 p_i + \beta_2 p_i^2 + \beta_3 p_i^3 + \varepsilon^t \quad (4)$$

To each subject i there is a corresponding vector $\left(\hat{p}^{happiness}, \hat{p}^{polical\ stance}, \hat{p}^{weight}, \hat{p}^{height}\right)'$. Given that the errors committed by the same individuals are likely to be correlated, a simple ordinary least squares estimator that independently estimates all the single equations would be inefficient. Accordingly, Equation 3 needs to be estimated jointly using a seemingly unrelated regression (SUR) model, which will also allow us to compare subjects' precision with respect to the different characteristics. A full estimation is carried out in Table 5 in the Appendix, but to summarize, in all cases individuals make systematic mistakes. In the happiness, weight and height cases, the coefficient of the regression is strictly below 1 (the tests can all be rejected with a p-value < 0.001) and the constant terms are highly significant. In the political views case the estimated model is indeed cubic with respect to the correct distribution.

We used a number of control questions to assess whether other individual characteristics affected participants' ability to correctly assess their position in the distribution. For example, while the questions were kept simple we might nevertheless worry that those with severe problems dealing with probability might have difficulty with implied population distributions. We asked a control question: "You have a 20% chance of winning £100, a 40% chance of winning £10 and a 40% chance of winning £0. What are your expected winnings?" We regressed the predicted against the real distributions adding an interacted term for individuals that correctly answered this question and, using a SUR model, found that this was not a concern (the full estimation is presented in Table 6 in the Appendix). The only possible exception is for height where the interacted term is positive at a 10% confidence level. However, the hypothesis that the sum of the linear and the interacted coefficient are equal to 1 can be rejected at the 5% level (p-value 0.098). Similar exercises using gender differences, level of mathematical training, and other available characteristics found no statistically significant effect.

Conclusion

We found that individuals consistently and substantially overestimate how like themselves the population in general tends to be. This problem operates across very different characteristics such as height, weight, political stance and happiness. The implications for the way human behaviour is modelled by scientists across many disciplines is profound – and this fact helps to explain so much, such as the preponderance of extremists who nevertheless feel they are representative of the population at large, or how some individuals perceive general happiness

while others are sure that discontentment is rife. This last point is especially important as, to the best of our knowledge, we are the first to show that individuals can be consistently biased in their beliefs about the happiness of others relative to themselves.

Natural scientists and psychologists may also be interested in our results – we would hope that neuroscientists, behavioural and cognitive psychologists, and evolutionary biologists might be able to suggest novel ways of addressing the obvious question that our work brings to the scientific community: how and why should such biases persist?

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Appendix

Figures

Figure 1: Real and Perceived Cumulative distributions

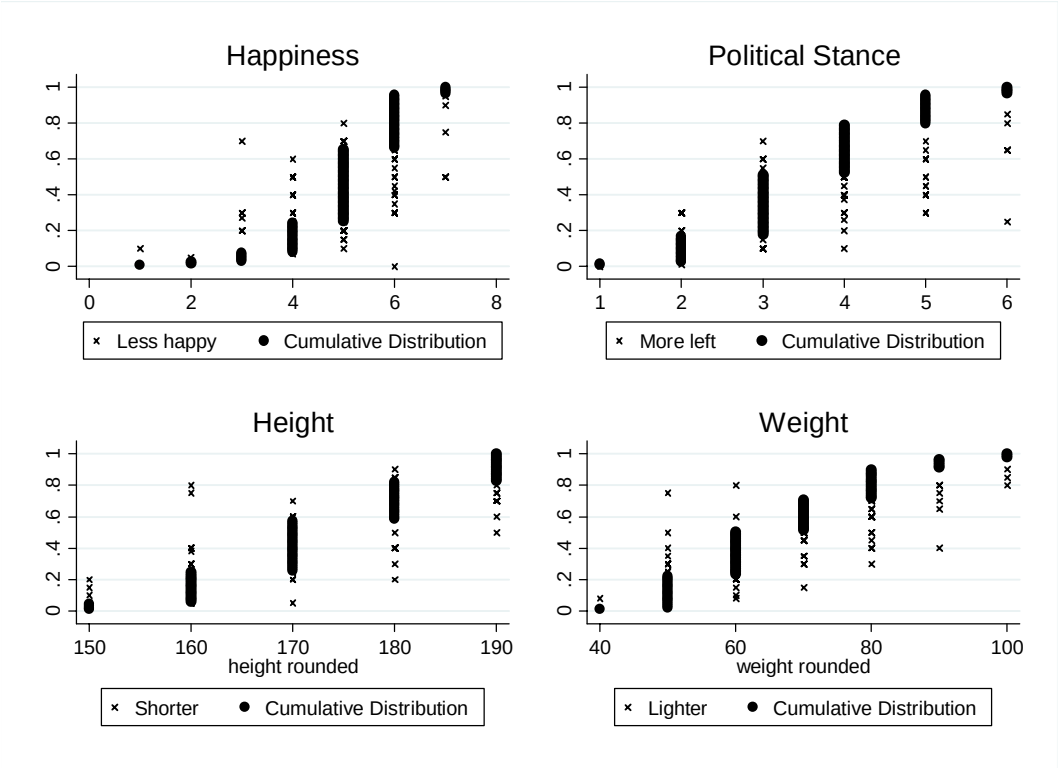


Figure 2: Real and Perceived Cumulative Distributions

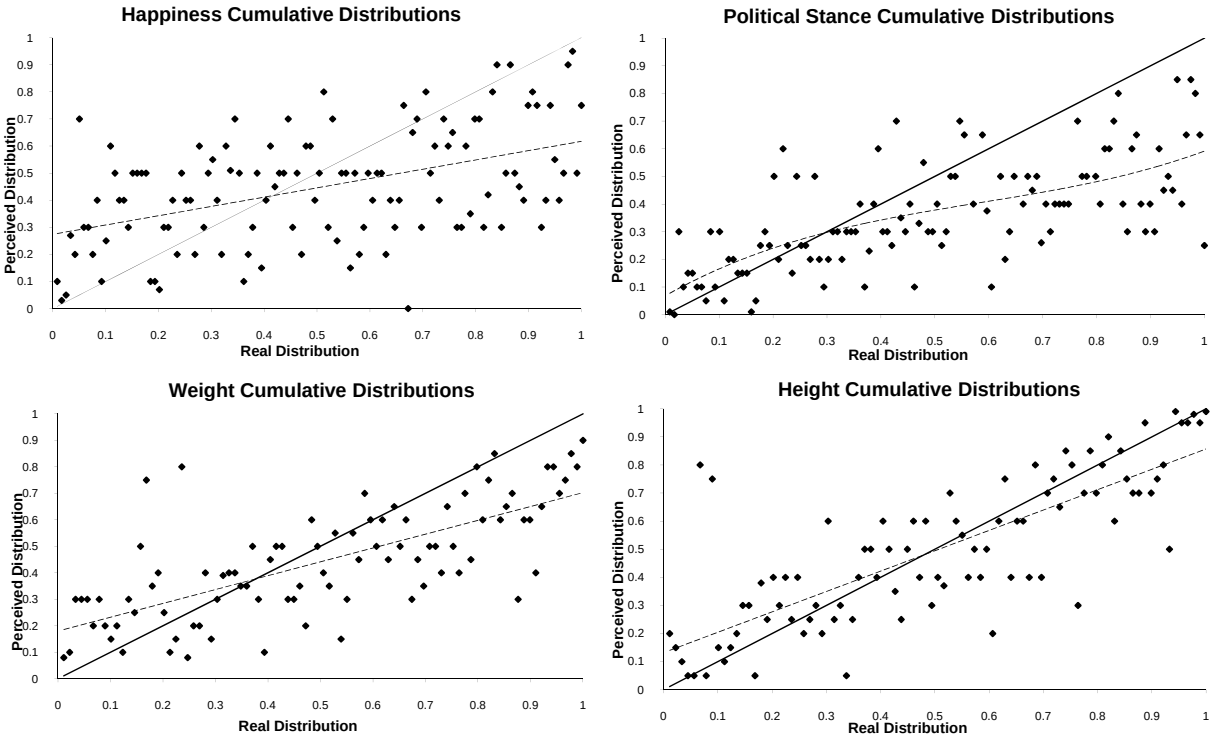
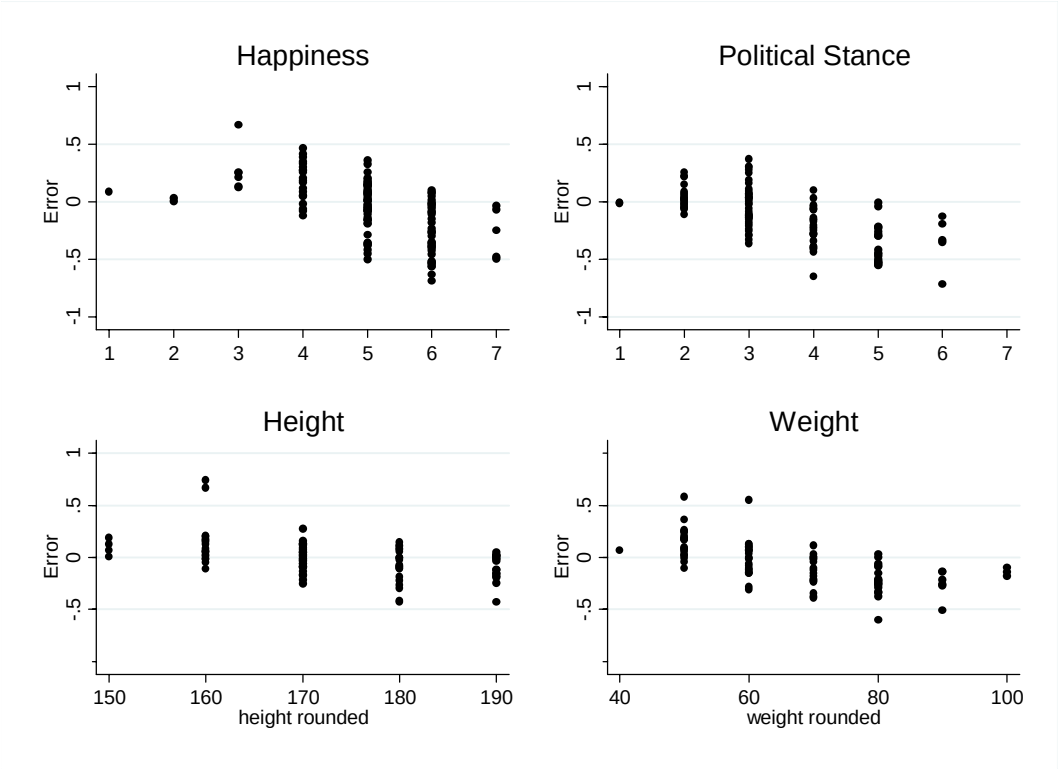


Figure 3: Errors between Real and Perceived Cumulative distributions



Tables

Table 1: Summary Statistics

Variable	Observations	Mean	Std. Dev.	Minimum	Maximum
Happiness	119	5.033613	1.065107	1	7
Political	119	3.554622	1.117636	1	6
Weight	89	66.47191	13.10369	43	101
Height	89	172.8989	11.08238	148	194
Less Happy	119	44.70588	21.08632	0	95
More Left	113	36.07522	19.60927	0	85
Lighter	89	44.4382	21.23888	8	90
Shorter	89	49.8427	26.50939	5	99
Age	119	19.54622	1.21953	18	23
Male	119	0.5462185	0.4999644	0	1

Table 2: Squared Errors from the "correct" model

Variable	Observations	Mean	Std. Dev.
$\left(err_i^{happiness}\right)^2$	119	.073493	.0948317
$\left(err_i^{political}\right)^2$	113	.0657311	.0953444
$\left(err_i^{weight}\right)^2$	89	.0446252	.0691131
$\left(err_i^{height}\right)^2$	89	.0320972	.0790957

Table 3: Two Sample t-test on Errors of Perception

H_0	p-value
$\left(err_i^{happiness}\right)^2 = \left(err_i^{political}\right)^2$	0.5349
$\left(err_i^{happiness}\right)^2 = \left(err_i^{weight}\right)^2$	0.0118
$\left(err_i^{happiness}\right)^2 = \left(err_i^{height}\right)^2$	<0.001
$\left(err_i^{weight}\right)^2 = \left(err_i^{height}\right)^2$	0.2621

Table 4: Errors from the Random Model

Variable	Observations	Mean	Std. Dev.
$\left(\hat{p}_i^{happiness} - \hat{p}_i^{random}\right)^2$	119	0.107	0.011

Table 5: Estimation of the Distributions

Variables	(1) Less Happy	(2) More Left	(3) Shorter	(4) Lighter
Cumulative	0.247***	1.834***	0.718***	0.540***
	(0.0696)	(0.430)	(0.0551)	(0.0479)
Cumulative^2		-3.127***		
		(1.006)		
Cumulative^3		1.963***		
		(0.663)		
Constant	0.325***	0.00450	0.128***	0.168***
	(0.0408)	(0.0490)	(0.0326)	(0.0287)
Observations	85	85	85	85
R-squared	0.123	0.596	0.674	0.574

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are in parentheses. "Cumulative" is a variable that measures the real cumulative distribution of each dependent variable.

Table 6: Estimation of the Distributions
(controlling for the correct answer to the probability question)

Variables	(1) Less Happy	(2) More Left	(3) Shorter	(4) Lighter
Cumulative	0.237***	0.420***	0.650***	0.513***
	(0.0841)	(0.0581)	(0.0717)	(0.0575)
Cumulative x corr.	0.0725	0.139	0.177	-0.0324
	(0.138)	(0.0914)	(0.120)	(0.0975)
Corr.	0.0906	-0.0459	-0.0758	0.120*
	(0.0787)	(0.0522)	(0.0752)	(0.0613)
Constant	0.282***	0.152***	0.150***	0.143***
	(0.0510)	(0.0326)	(0.0379)	(0.0316)
Observations	85	85	85	85
R-squared	0.225	0.570	0.676	0.627

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are in parentheses. "Corr." is a dummy variable set at 1 if the subject answered the probability question correctly. "Cumulative*corr." Interacts the "Corr." with the "Cumulative" variable.

Questionnaire

Most of the questions in the questionnaire were followed by a drop-down menu with a choice of options (e.g. male or female for gender, 1-7 for happiness, etc.) which are omitted for brevity. Note that the questionnaire continues on the next page.

QUESTIONNAIRE

Instructions
Please complete the following questionnaire to the best of your ability. Always use the highlighted yellow cells to input your answers, and scroll down when there is a menu selection. The end of the questionnaire is indicated by the text "END OF QUESTIONNAIRE".
Please continue scrolling down and answering questions until you reach then end. Please raise your hand at any time if you have any questions. Your answers will remain entirely anonymous and private and will only be linked to your temporary user ID for this experiment and not your real name or university ID.

Demographic Information
What is your gender?
What is your age?
What is your Nationality?

Education
What is the main academic department or school where your degree programme is based?
Select the one that is most relevant to your particular interests if you are in an interdisciplinary course of study.
Did you study maths up to and including your final year at school? (e.g. A-level, SL or HL IB, etc.)

Participation in Elections
Please answer "no opportunity" if you have never been able to vote in a particular type of election. For example, if you were under age or not entitled to vote, or have not yet had the opportunity to do so since becoming eligible.
How often do you vote in student elections?
How often do you vote in local government elections?
How often do you vote in national government elections?
How often do you vote in European elections?

Today's Session
What would you say the voting system that was used today is called?
In general did you ever feel rushed into making a decision at any point in the session?
How long on average would you say you thought about your vote when all the preferences were revealed?
How long on average would you say you thought about your vote when there was a poll on the most favoured candidate?
How long on average would you say you thought about your vote when there as a poll on the least favoured candidate?
Did you follow any rules or principles while voting or did you vote randomly?
If you used and rules or principles please describe them below (in as much detail as you wish).
Did you consider the potential payment important when casting your vote?
Did you always vote for your favourite candidate?
Did you consider voting to stop your least favourite candidate from winning?
Did you look at the preferences that were allocated to you?
Did you look at the preferences of others when they were available?
Did you use poll results on the most preferred candidate when they were available?
Did you use poll results on the least preferred candidate when they were available?

[continued on the next page]

Voting Behaviour
Do you enjoy voting?
Do you usually discuss how you vote with your friends or family?
Do you usually reveal who you vote for to friends or family?
Would you normally behave differently when voting in elections with more than 3 candidates?
Consider the following situation. There is an election with three candidates, A, B and C. You like A best and C worst. You know A is unlikely to win, and race is between B and C. Would you vote for B if you felt it might stop C winning?

Politics
Do you find politics interesting?
Do you take part in political campaigns?
If the answer to the above question was yes, which ones have you participated in recently?
Do you usually discuss how you vote with your friends or family?
Do you usually reveal who you vote for to friends or family?
How would you rate your political beliefs at the moment?
Please use a 7-point scale where 1 is far left, 2 is left, 3 is centre left, 4 is centre, 5 is centre right, 6 is right and 7 is far right.
What percentage of students at Warwick do you think are more left-wing than you? (%)
Do you have an allegiance/support a particular political party?
Miscellaneous
Consider the following situation. You have a 20% chance of winning £100, a 40% chance of winning £10 and a 40% chance of winning £0. What are your expected winnings?
How would you rate your happiness at the moment?
Please use a 7-point scale where 1 is completely sad, 2 is very sad, 3 is sad, 4 is neither happy nor sad, 5 is fairly happy, 6 is very happy and 7 is completely happy.
What percentage of students at Warwick do you think are less happy than you are? (%)

In life, we are often asked to make predictions about (or we will often gamble on) our own ability to solve problems, complete tasks or win games of skill. In such situations, there are often consequences (for example: financial, emotional or reputational) if we achieve a level which is different from our initial prediction. When setting a prediction two considerations which may affect your choice are:
A) "I am worried that I might set my predictions or aspirations too high, end up not meeting them, and regret setting an unattainable goal"
B) "I am worried that I might set my predictions or aspirations too low, end up exceeding them, and regret not having more belief in my own ability"

For you personally, place a percentage on the relative effect that considerations of A or B might have on your choice of prediction if faced, in the future, with a task where you were asked to predict or gamble on your own ability.
For example, if you think A and B would weigh equally on your mind, answer 50% for both, or if you would only ever consider one, place 100% on that and 0% on the other.

Relative effect of A (%)
Relative effect of B (%)
Have you ever answered a question similar to this in a past experimental session?

Height & Weight
What is your height (in feet or cm)
What percentage of students (male or female) do you think are shorter than you? (%)
What is your weight (in kg or stones)?
What percentage of students (male or female) do you think are lighter than you? (%)

END OF QUESTIONNAIRE